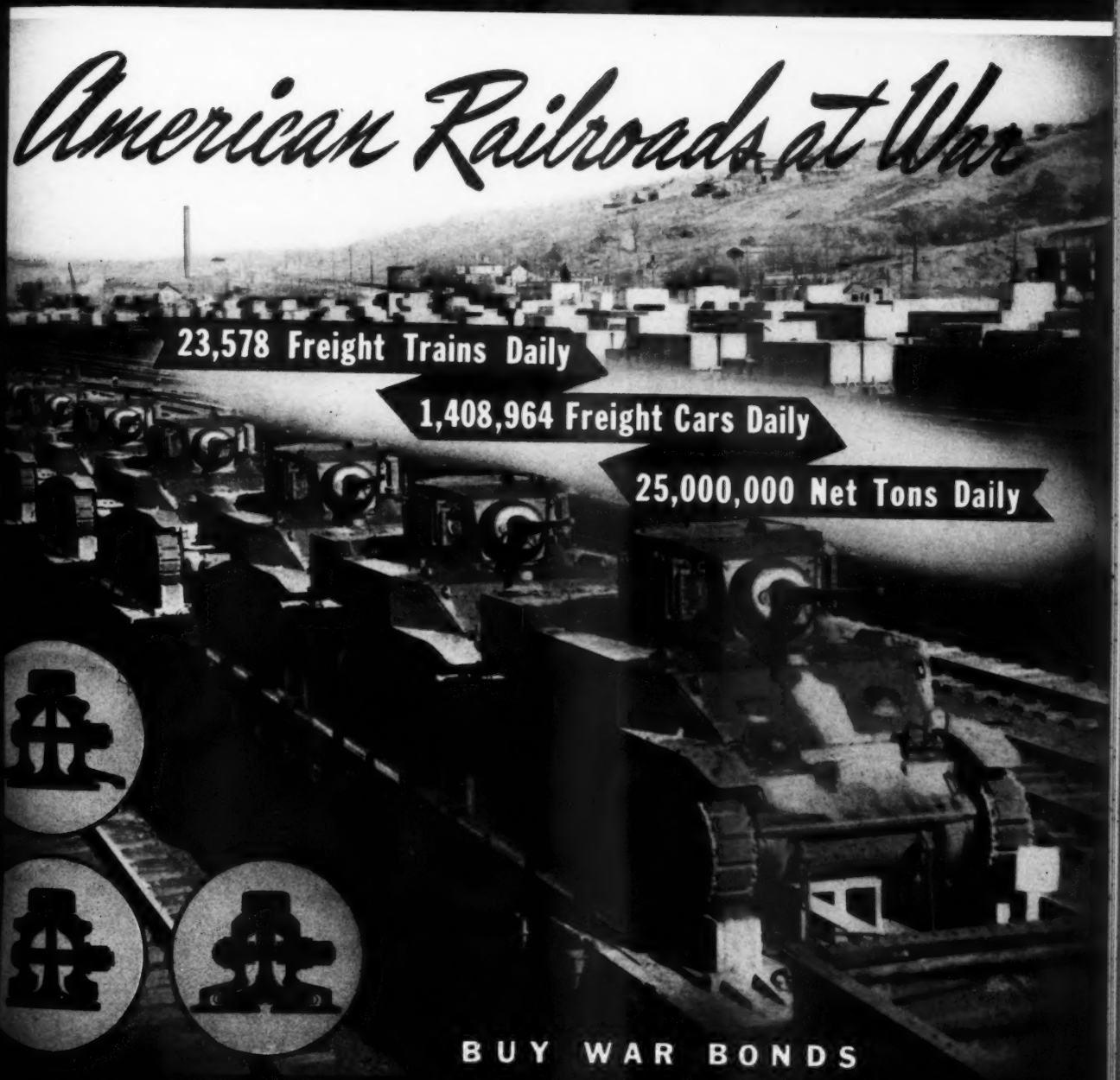

American Railroads at War
23,578 Freight Trains Daily
1,408,964 Freight Cars Daily
25,000,000 Net Tons Daily
BUY WAR BONDS

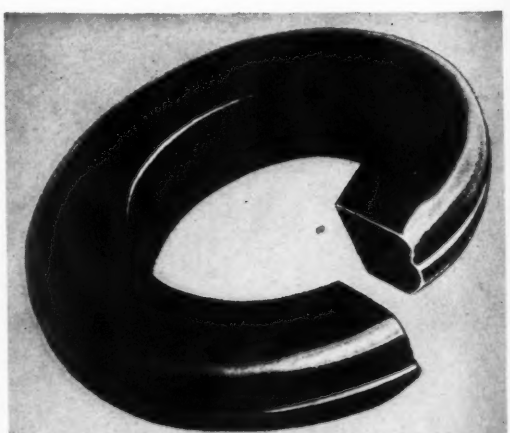
Reliance **HY-CROME** *Spring Washers*

MANPOWER

SHORTAGE
Solved by HY-CROME Springpower

Railroads have kept the flow of men and materials moving to the war fronts, while serving the home front doing a superb job in spite of the manpower shortage thru use of methods and devices which are labor saving and efficient.

HY-CROME spring washers do a super job in reducing maintenance periods to a minimum while important bolt tension is maintained. They also help cope with the manpower shortage—DO YOU TAKE ADVANTAGE OF HY-CROME?



HY-PRESSURE HY-CROME
Edgemark of Quality

Eaton Manufacturing Company

RELIANCE SPRING WASHER DIVISION

MASSILLON, OHIO

New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal

Published monthly by Simmons-Boardman Publishing Corporation, 105 W. Adams St., Chicago 3, Ill. Subscription price: United States and Possessions, and Canada, $2.00; Foreign, $3.00. Single copies 35 cents. Entered as second-class matter January 20, 1933, at the postoffice at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., postoffice. Address communications to 105 W. Adams st., Chicago 3, Ill.

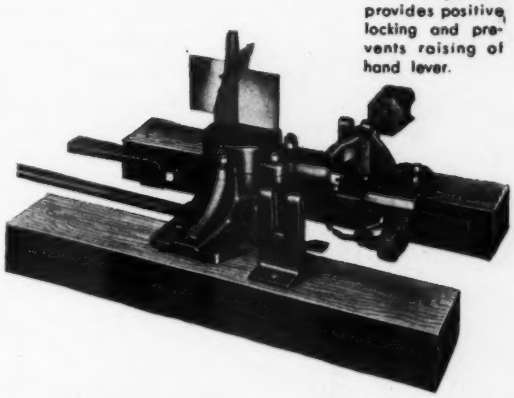
WHERE HAND-OPERATED SWITCHES ARE LOCATED ADJACENT TO HIGHWAY CROSSINGS . . .
Safeguard Traffic with the Racor Switch Point Lock
Point attachment showing locking rod clamped to switch points.

Eliminate the hazard of having service interrupted as a result of unlocked switch point moving. What can cause unlocked switch points to move? Among other things, by having a switch stand knocked down by dragging equipment or as a result of a collision with highway traffic. Lock your switches with the Racor Switch Point Lock! The mechanism is entirely separate from the stand and located below the top of the ties, thus assuring a locked switch, even if the stand is knocked down.

Other features of the Racor Switch Point Lock are:

1. Easy installation and maintenance.
2. Simple and accurate adjustment.
3. Convenient treadle release, which does not delay opening of switch.
4. Direct clamping of locking rod to switch points.
5. Impossible to insert padlock unless switch is properly closed.

We'll be glad to furnish detailed information upon request.



Lock for Ground Throw stands. Note that one padlock provides positive locking and prevents raising of hand lever.

RAMAPO AJAX DIVISION

230 Park Avenue RACOR **New York, N.Y.**

HILLBURN, N. Y. — EAST ST. LOUIS, ILL. — LOS ANGELES, CAL.
NIAGARA FALLS, N. Y. — PUEBLO, COLO. — SEATTLE, WASH.
CHICAGO, ILL. — SUPERIOR, WIS. — NIAGARA FALLS, ONTARIO

Brake Shoe

FOR TAMPING

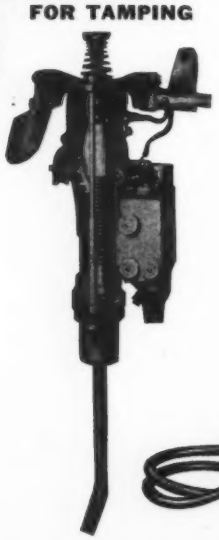
BARCO TYTAMPERS

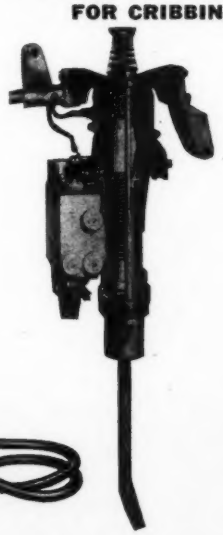
With 1943 railroad traffic already exceeding the peak traffic of 1942, it is today more than ever essential to help protect rail life by spot tamping joints and otherwise keeping the ballast in suitable condition.

Barco Unit Tytampers being self-contained and easily carried by one man allow more time on the job, maximum production with resultant cost reduction and well tamped track that retains surface and alignment longer.

Maintaining track by tamping low spots is much more economical and satisfactory than repairing track that has been neglected. Barco Tytampers are suitable for spot tamping or gang tamping.

FOR CRIBBING





Now Used by 91 Railroads

Eight Years of Satisfactory Service

BARCO MANUFACTURING COMPANY

1805 W. Winnemac Ave. NOT INCORPORATED Chicago, Illinois

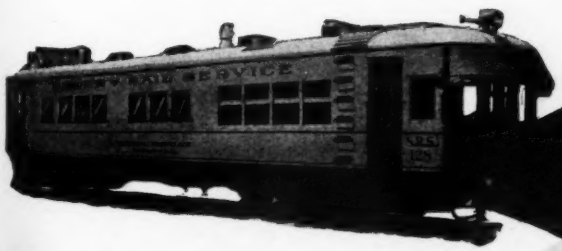
In Canada THE HOLDEN COMPANY, LTD.

Montreal — Moncton — Toronto — Winnipeg — Vancouver

CHESSIE SLEEPS, ASSURED . . .

with SPERRY RAIL SERVICE

Never before have our railroads been called upon to do so much in so little time, as now when Victory demands delivery—on schedule! The Chesapeake and Ohio Lines, geared to the war needs of the nation, are a good example of how America is doing the "impossible." Imbued with the spirit of service, the Chesapeake and Ohio permits nothing to delay vital transportation and, working with the C & O are Sperry Detector Cars that test the rails of more than 80 other railroads in the United States and Canada. Manned by highly-trained and experienced personnel, these Sperry Detector Cars have been proven as the most efficient equipment used for rail testing.



SPERRY'S FLEET of 17 Detector Cars, with the most efficient rail-testing equipment in the world, has tested over **216,500** miles since Pearl Harbor.

SPERRY
Rail Service

HOBOKEN, N. J. • CHICAGO, ILL.

POINTING THE POST-WAR WAY TO OFF-TRACK EQUIPMENT

TWO 1¼yd. LINK-BELT SPEEDERS

Here are two more examples of the way efficiency and economy-minded railroads are turning to Link-Belt Speeder off-track equipment for work on maintenance jobs without interference with the train schedules. These machines can be shifted from one spot to another quickly and with a minimum of trouble. Link-Belt Speeder shovels, draglines and cranes are helping to maintain right-of-way, banking, ditching, doing bridge work and similar type jobs. There are 22 different models of Link-Belt Speeder crawler and wheel mounted shovels, draglines and cranes — a machine to fill every need—with power, stamina, and dependability.

THE MORE BONDS YOU BUY — THE SHORTER THE WAR

9298

LINK-BELT SPEEDER

BUILDERS OF THE MOST COMPLETE LINE OF
SHOVELS—
CRANES—
DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO, ILL.
(A DIVISION OF LINK-BELT COMPANY)

AIRCOWELDING of worn rail ends speeds up vital track maintenance, conserves new rail and keeps war materials moving on schedule.

Airco R. R. X welding rod used for building up worn rail ends produces joints more wear-resistant and with a higher Brinell hardness than when new.

Airco R. R. X rod can be secured through any Air Reduction office.

Our Engineering Department can furnish complete information on Airco welding of worn rail ends and other welding operations which are helping the railroads in essential maintenance of war work.

BUY UNITED STATES WAR BONDS

Air Reduction

General Offices: 60 EAST 42nd ST., NEW YORK 17, N. Y.

IN TEXAS: MAGNOLIA AIRCO GAS PRODUCTS CO.

General Offices: HOUSTON, TEXAS

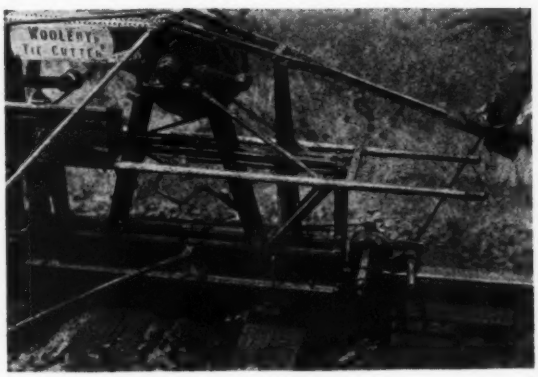
AIRCO

WILSON

IDLE CYLINDERS ARE PRODUCTION SLACKERS: *Keep 'em rolling for victory!*

WHAT A PAIR!

. . . for beating the Labor Shortage



The WOOLERY JUNIOR Weed Burner . . .

is the complete answer to the maintenance officer's urgent need for quick, efficient means for burning weeds on and off track, with minimum use of hard-to-get labor.

The JUNIOR Weed Burner is a one-man machine, designed to eradicate vegetation quickly and thoroughly for a distance of 10 feet from the center of the track. It cleans the inter-track space, as well as ditches, slopes, etc. The JUNIOR Burner uses a minimum of oil, and, in addition to its important savings of both labor and time, does the job at lowest cost.

"There's a Reason" why more than 75 railroads are using Woolery Weed Burners to simplify track maintenance.

The WOOLERY Tie Cutter . . .

another great saver of labor and time in track maintenance. It speeds tie renewal work from start to finish, requires only one man to operate. The Cutter saws the tie into three easily-removed pieces, leaving the tie-bed undisturbed, ready for the new tie . . . . it eliminates trenching and reduces tamping to a minimum. Tie renewal costs are cut as much as 30 per cent and renewal schedules shortened by weeks.

Ask us TODAY to prove to you that the WOOLERY TIE CUTTER can save labor, time and money for you.

WOOLERY MACHINE COMPANY

MINNEAPOLIS — Pioneer Manufacturers of — MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

TIE CUTTERS • SWITCH HEATERS • MOTOR CARS

RAILWAY WEED BURNERS • BOLT TIGHTENERS

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Can you get

each of your employes to

BUY AN EXTRA $100 BOND

in September?

That's the problem.

That's the job of the Third War Loan.

The objective is to raise fifteen billion dollars. No one ever set out to raise fifteen billion dollars at one time before in all the history of the world. To raise that kind of money, you have to go where the money is . . . the idle money.

72% of all the *idle* money is estimated to be in the hands of people who work for wages.

They are the employes on your *payroll* and the employes on other business men's *payrolls*.

You are the quickest, most direct route to those millions of men and women.

You know them.

You have access to them.

They are *your* particular *prospects*.

If you can get each of them to buy at least one extra $100 war bond (price: $75), in addition to their regular payroll deduction purchases, the Third War Loan will be a success.

We are listing below some of the things you can do to help sell an extra bond to each one.

Will you do them?

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

HERE'S HOW TO DO IT!

This brief outline was prepared expressly for your use by a nationally-known firm which recently directed a successful war bond selling drive among a large group of Koppers employes.

You have undoubtedly served on some money-raising campaign in your city . . . for your favorite hospital, or community fund, or Red Cross.

You know how those campaigns are organized.

Organize one in your own plant or plants for the Third War Loan.

1. Appoint a campaign committee, or have the labor-management committee appoint one.

2. Head it up with a chairman who is aggressive and a go-getter.

3. Have committees set up for each shop or each department. Organize them as teams, to compete with each other. Americans love competition . . . we love to make a game of our work. Appoint leaders for all committees and give them military titles.

4. Appoint a campaign manager who can devote full time to the campaign until you reach your goal.

5. Start with a big rally. Get your local Army or Navy office to send officers and men to take part in the rally, or have a returned war hero appear, for morale purposes. If you are working on war work make some special shipment as part of that rally.

6. Put up exhibits and posters around the plant which you can get from your local War Loan headquarters.

7. Have a bulletin board on which you can post daily the *percentage* of employes who have signed up in each department or on each team.

8. Have some newspaper publicity about what you are doing. It will encourage your people and will help the company, too. Tell the publicity director of your local War Bond campaign what you are doing.

9. Where employes are unable to afford a $75 expenditure for a $100 war bond, encourage them and members of their families to sell war stamps to their friends and neighbors and credit these sales against the team total.

10. End the campaign with a rally and honors or prizes for the biggest producers or hardest workers.

KOPPERS COMPANY, WOOD PRESERVING DIVISION, PITTSBURGH, PA.

KOPPERS

★ ★ ★ ★ ★ THE INDUSTRY THAT SERVES ALL INDUSTRY ★ ★ ★ ★ ★

SOUND ENGINEERING ADVICE

✓ *Design* in TIMBER

✓ *Specify* TECO CONNECTORS

✓ *Employ* a Teco Timber Fabricator

'Round the World—100,000 timber war and peacetime structures have been quickly and economically built with the TECO Timber Connector System of Construction—sponsored by the lumber industry since 1933.

The TECO Split-Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood . . . brings the full structural strength of lumber into play.

Write for FREE copy of "Heavy Timber Construction Details"—just off the press. Always specify TECO Connectors.

TIMBER ENGINEERING COMPANY

NATIONAL MANUFACTURERS OF **TECO** *TIMBER CONNECTORS AND TOOLS*

WASHINGTON, D. C. PORTLAND, OREGON

PLANNED STRATEGY

...l Series E — One-
... Four-Man Inspec-
...n Car. 750-lb. load
...pacity. Lift weight,
... lbs.

Features of simplified construction and operation have come to be taken for granted in all Fairmont motor cars. Yet, behind these logical conclusions there is intensively planned strategy . . . engineering knowledge gained the hard way by men who get their understanding of railroading needs by riding the sections. But the planning must go further than the mere providing of conveniences . . . complications must be avoided, bulk and weight must be held to a minimum, space must be saved for the comfort and safety of the men and for tool accommodation, balance must be preserved for easy handling and fuel economy. Above all, simplified construction must be backed by ease of accessibility to permit of quick adjustments and minor repairs in the field.

Every Fairmont improvement has a definite practical value that is tested and proved in everyday operation before it is released and, usually, it is so constructed that it is applicable to previous models. Fairmont's planned strategy is the result of 34 years' experience devoted exclusively to creation and production of railway maintenance equipment. Fairmont Railway Motors, Inc., Fairmont, Minnesota.

Fairmont

RAILWAY MOTOR CARS

Performance ON THE JOB COUNTS

OF ALL THE CARS IN SERVICE TODAY

More Than Half are Fairmonts

Another PERFORMANCE REPORT ON J-M ASBESTOS SHINGLES--

GOLDENS BRIDGE, N.Y.

WHEN APPLIED: March, 1922

MAINTENANCE: None in 21 years

PRESENT CONDITION: Excellent, good for many more years

REMARKS:

It's the unusual qualities of Johns-Manville Asbestos Shingles that are responsible for such performance records as this. Made of asbestos and cement, they are rotproof, weatherproof, fireproof, permanent as stone...eliminate the necessity for preservative treatment.

FOR ROOFS—J-M American Colonial Asbestos Roofing Shingles
FOR SIDEWALLS—J-M Cedargrain Textured Asbestos Siding Shingles

JOHNS-MANVILLE JM PRODUCTS

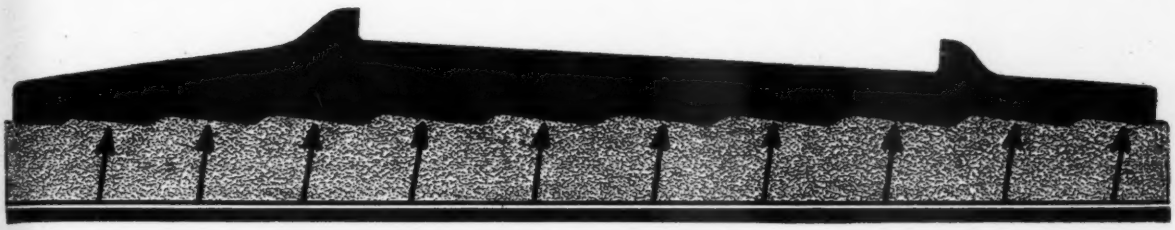
Johns-Manville Asbestos Roofing Shingles and Siding Shingles are now available for permanent repairs and new installations where necessary. For complete details, write Johns-Manville at New York, Chicago, Cleveland, St. Louis or San Francisco.

JOHNS-MANVILLE
85 YEARS OF SERVICE TO TRANSPORTATION

GOOD TRACK MAINTENANCE

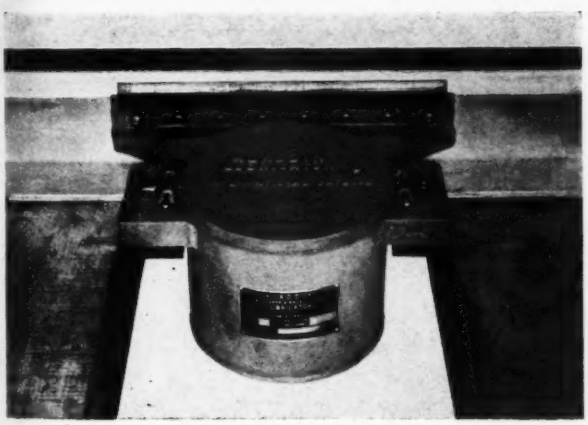
Was Never More Important

IN ALL HISTORY



Lundie Tie Plates and Aladdin Lubricators Conserve Steel

The greatly increased traffic due to the war, demands thorough track maintenance. It is essential that the railroads have more maintenance material if they are to fulfill the task they are called upon to perform.



Aladdin lubricators reduce wear on the rail as much as 30%. It is one of the lowest cost lubricators on the market. The grease is discharged by vibration; ramps and pumps are eliminated.

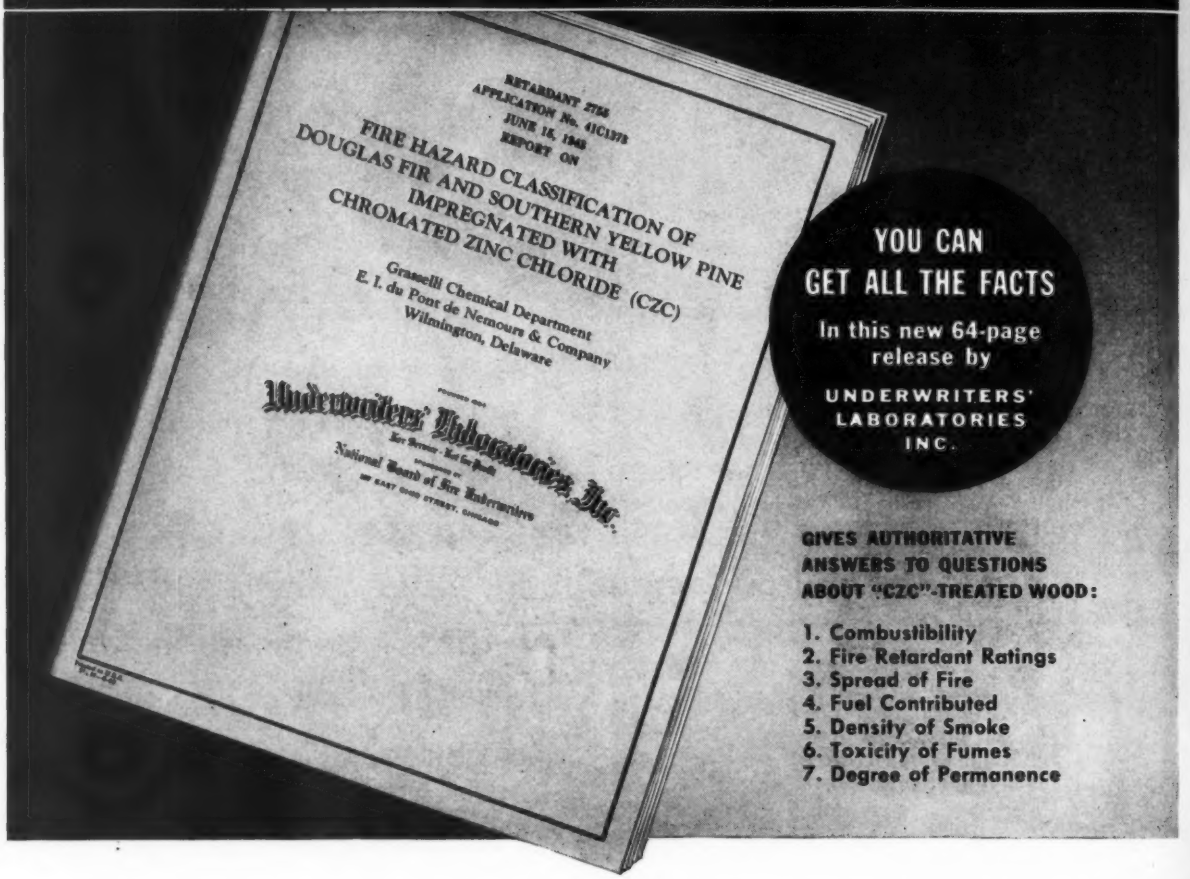
The Lundie Tie Plate and Aladdin Lubricator conserve critical material and provide better track conditions, enabling the railroads to more efficiently meet the constantly increasing demands for transportation. Due to the economical design of the Lundie Tie Plate 10% less steel is required in their manufacture, and maximum protection to ties and proper bearing for the rail are achieved by the inclined stepped seating.

THE LUNDIE ENGINEERING CORPORATION

Tie Plates—Spring Rail Clips—Safety Tongs for Handling Track Material—Aladdin Rail and Flange Lubricator

19 WEST 50th ST., NEW YORK — 59 E. VAN BUREN ST., CHICAGO

REPORT ON THE FIRE RESISTANCE OF "CZC"-TREATED WOOD



THIS authentic technical report from Underwriters' Laboratories, Inc., supplies the facts you have asked for. It gives detailed information on the relative degree of protection given by varying amounts of Chromated Zinc Chloride in treated lumber. Use the coupon below or write today for your Report on the fire resistance of "CZC"-treated wood. E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Department, Wilmington, Delaware.

DU PONT
REG. U. S. PAT. OFF.

CZC

CHROMATED ZINC CHLORIDE

WOOD PRESERVATIVE

USE THIS VALUABLE COUPON TODAY

E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Department
2504 Nemours Bldg., Wilmington 98, Delaware

Please send me the Underwriters' Laboratories, Inc., report on "CZC"-treated wood.

NAME_____

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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

★ FIRST ON THE RAILS AND STILL FIRST ★

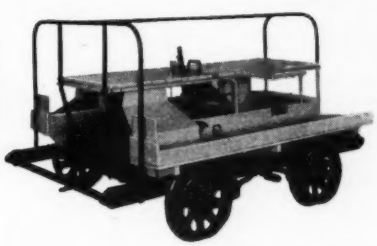
Designed by Men Who Know Railroading

Fairbanks-Morse Sheffield and Eclipse Motor cars are still first on the rails because they have *all* of the features a car should have . . . and all of those features are *good.*

There are 12 models—water cooled, air cooled, chain drive, belt drive. *Eclipse* models are belt-driven. *Sheffield* Models are chain-driven.

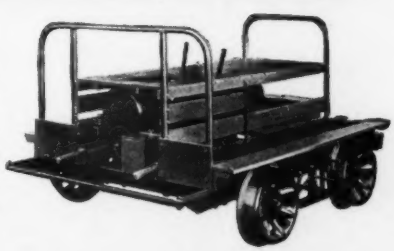
Sheffield
Model 40B with cab

Two-cylinder air-cooled engine permits full load operation for hours without overheating. Engine develops exceptionally high torque at low speeds. Friction transmission. Chain drive. Steel frame. Thousands in service.



Sheffield Model 40B with special safety railing

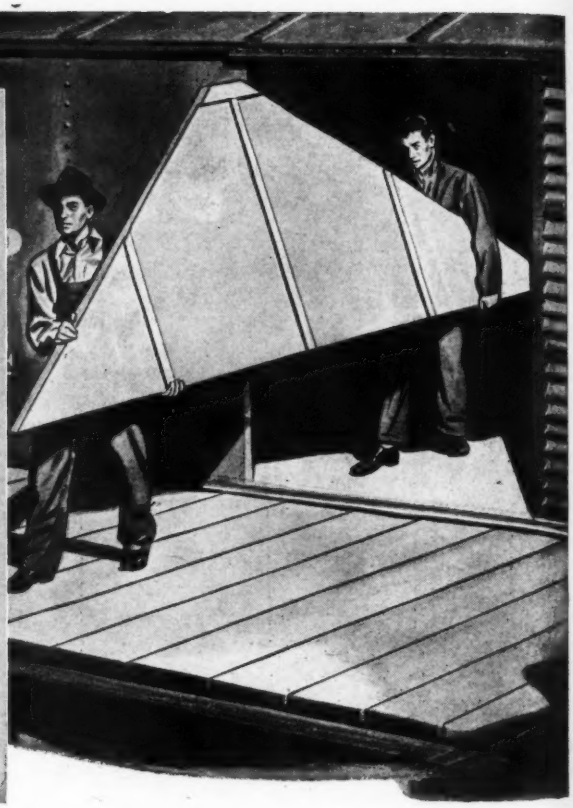
Sheffield Model 53
Weighs 929 pounds with rear end lift of only 124 pounds. Has 8- to 13-hp., water-cooled motor with air-cooled head. Space for full section gang and tools.



Buy War Bonds

FAIRBANKS, MORSE & CO.
FAIRBANKS-MORSE BUILDING, CHICAGO, ILL.
RAILROAD SALES OFFICES: NEW YORK • BOSTON • CHICAGO • ST. LOUIS • ST. PAUL
CINCINNATI • ATLANTA • NEW ORLEANS • DALLAS • SAN FRANCISCO
Export Division: 80 Broad Street, New York City
Canada: Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Winnipeg

Housing *as fast as trains can get it to you*



Are you confronted with the problem of housing railroad personnel quickly? "Texas Pre-Fab" has the answer in Victory Housing —the completely pre-fabricated, portable and demountable housing unit. In single units and in multi-units of any desired size, Victory Housing provides clean, comfortable shelter — economical in first cost and in operations.

Victory Housing units can be produced at the rate of more than 500 a day in our two giant Dallas plants and shipped ten to a freight car to meet urgent railroad needs. The single unit can be erected in six-man hours' time, larger installations in proportion.

Victory Housing can be demounted quickly, shipped and re-erected with ease. It may be stored under normal conditions indefinitely, without deterioration.

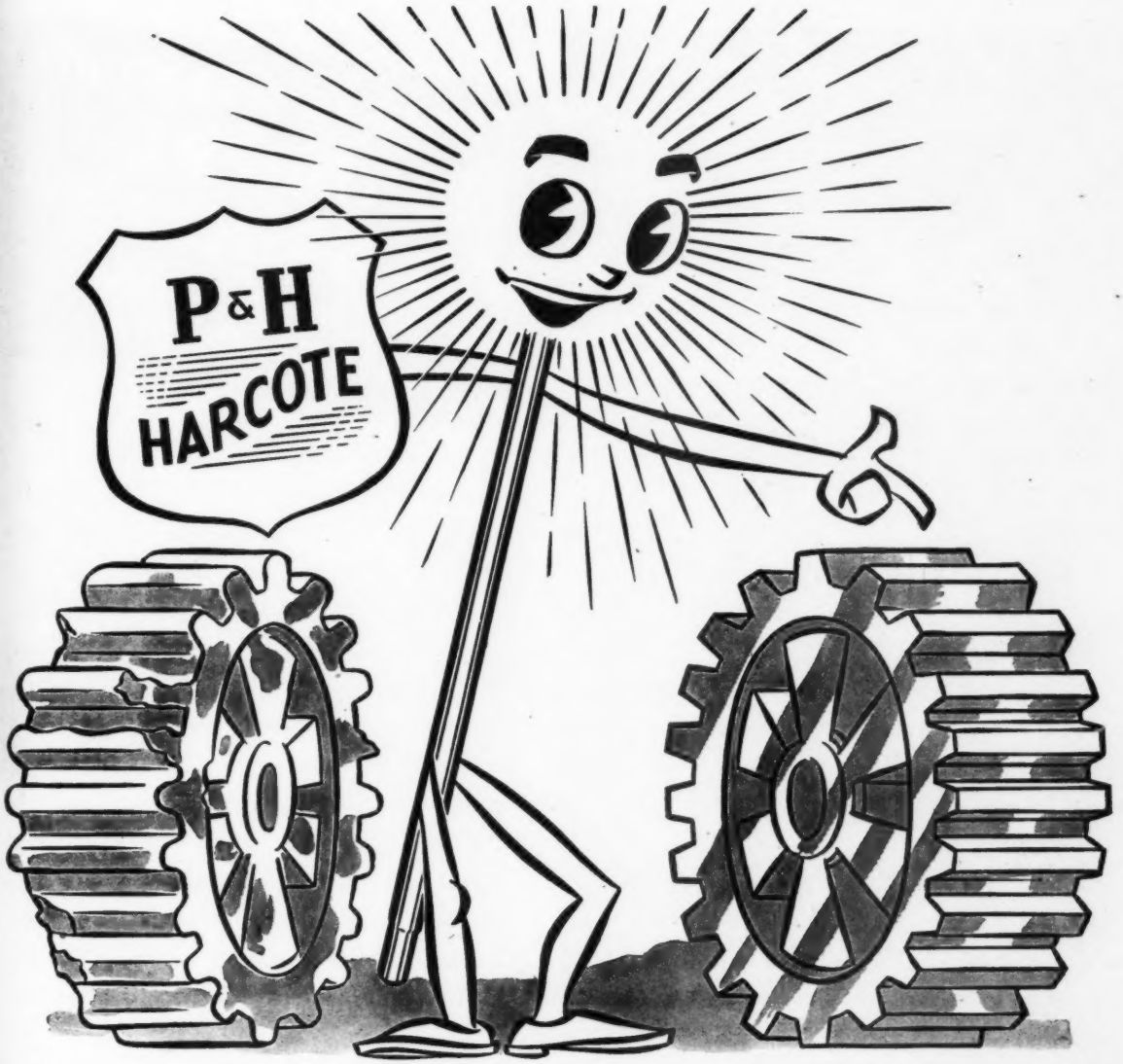
Victory Housing is cool in summer, easily kept warm in winter because of the Air-Space, double roof. It is long lived, versatile and flexible, and is equally suitable for waiting rooms, ticket offices, baggage rooms and other purposes. Glass sash instead of the weather tight window flaps may be specified at slight additional cost.

Chief Engineers, Maintenance of Way Engineers and others in charge of any type of railway housing are invited to write, wire or phone for further details and estimates of cost.

TEXAS PRE-FABRICATED HOUSE & TENT CO.

Dallas, Texas • Shoreham Bldg., Washington, D. C.

MAKERS OF "VICTORY" HUTS AND "VICTORY" HOMES
Reg. U.S. Pat. Off. Reg. U.S. Pat. Off.



MEET THE CHAMPION "BUILDER-UPPER"

When it comes to rebuilding worn parts, Harcote is the real champion electrode that gets in there—puts on a hard surface that's tough and long-lasting. An important time and money-saver, too! When worn parts would take weeks to replace—Harcote does the job quickly—at a fraction of the new part cost—gives you a part that will outwear the original.

Harcote is ideal for welding on carbon steel, low alloy and high manganese surfaces.

See your P&H representative for procedures. Also ask about P&H electrodes for any other welding requirements.

P&H

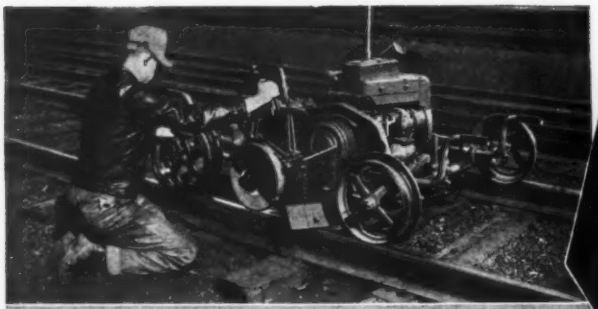
Also ask for Information on P&H A.C. and D.C. Welders

General Offices and Factory:
4606 West National Avenue, Milwaukee, Wisconsin

HARNISCHFEGER CORPORATION
WELDING ELECTRODES • MOTORS • HOISTS P&H ELECTRIC CRANES • ARC WELDERS • EXCAVATORS

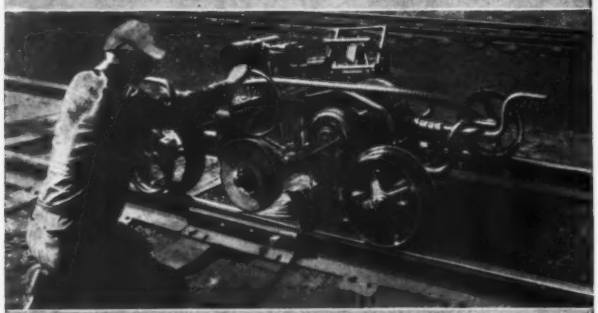
A New Star Has Been Added to P&H's Army-Navy "E"

Canadian Distribution: The Canadian Fairbanks-Morse Company, Ltd.

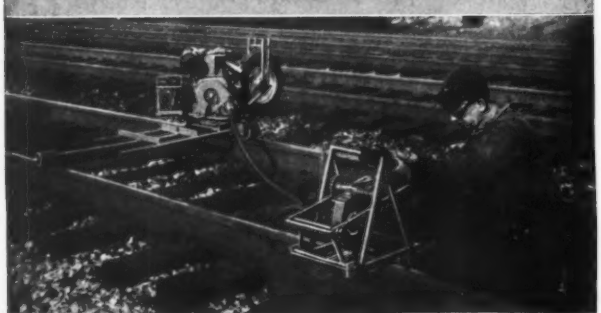


Model BG Heavy Duty Surface Grinder

There is a type of NORDBERG RAIL GRINDER for all maintenance grinding work



Model DG Light Weight Surface Grinder



Model UG General Purpose Utility Grinder

From this group of five Nordberg Grinders it is possible to select the type of machine best adapted to all forms of maintenance grinding. Every rail reconditioning program involving grinding operations can use these machines to advantage, not only because of their precision but for speed and capacity of work. This is especially important in these days of labor shortage. If you are doing grinding on rail, switches, crossings, etc., investigate the merits of Nordberg Grinders on maintenance work.

Model FG Flexible Arm Grinder

Model EG Midget Grinder

NORDBERG MACHINERY

NORDBERG MFG. CO. MILWAUKEE WISCONSIN

Export Representative—WONHAM Inc.—44 Whitehall St., New York

WOODINGS RAIL ANCHOR

HIGHEST REAPPLICATION VALUE

A WORD OF CAUTION

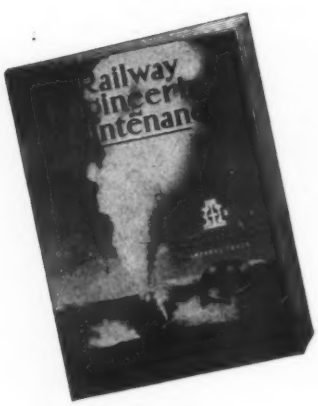
Use enough rail anchors to prevent all creepage. *Under-anchored track is a liability, not an asset.*

WOODINGS FORGE & TOOL CO.

VERONA, PA.

No Exhibit
at the Hotel

But



An Exhibit
in Print.

"An Exhibit in Print"

"Bill, I understand that the Roadmasters' Association has decided to reduce its usual three-day annual meeting to a one-day meeting of its executive committeee at which the other committees will present their reports and that attendance of members is expected to be confined principally to those living in the vicinity of Chicago," said the railway sales manager to his star salesman.

"That's correct, Boss," replied the star salesman.

"And I understand that the Bridge and Building Association is considering reducing its annual meeting to a one or two-day War Time Conference with a program streamlined to the particular problems of these days and a suggestion to its members that only those come from a distance whose attendance will be in the interest of their railways' war effort."

"That's what I hear."

"That will mean no exhibits at either meeting, of course."

"That's right."

"It's too bad that these men can't hold their regular meetings this year of all years to exchange experiences, for they need each other's help now more than ever before."

"A lot of them feel that way but with trains so crowded, they don't think that they should add to the congestion."

"That's a fine spirit. But how will these railway men gain access to their committee reports?"

"They've arranged with *Railway Engineering and Maintenance* to print them. That'll put the information in the hands of their members at once."

"That's a fine arrangement, for they all read that magazine. And, Bill, that suggests something for us."

"What's that?"

"They're putting their convention in print. We'll put our exhibit in print."

"That's a smart idea, Boss. If we can't meet them in person, we'll meet them in the magazine that brings their convention to them."

The Roadmasters' Convention in Print will appear in the October issue, for which forms will close Sept. 20. The Bridge and Building Convention in Print will appear in the November issue, forms for which will close Oct. 20.

RAILWAY ENGINEERING AND MAINTENANCE IS READ BY MAINTENANCE OFFICERS OF ALL RANKS

No. 177 of a Series

Railway
Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

Subject: Post-War Planning

September 1, 1943

Dear Reader:

Have you noticed how rapidly interest in post-war planning has increased in recent weeks as the progress of the Allied forces on all fronts gives promise of eventual and possibly speedy victory over the enemy? This does not appear to me to reflect over-optimism; rather it denotes a desire to be prepared for those changes that are inevitable when the nation returns to peacetime pursuits.

In few industries has the war made a deeper imprint than on the railways; likewise, few industries face greater changes and greater opportunities when the world-conflict ends. It is none too early for far-sighted railway officers, including those in engineering and maintenance of way, to begin to survey their needs and to devise means to meet them.

The questions that confront one so inclined are myriad:-

What competition will the railways face after the war? Will the present emphasis on air warfare leave the nation air-minded? What effect will this have on passenger travel? On freight, especially high value and perishable commodities? Will the trucks recapture long haul traffic which they have so largely lost of late? What measures can the railways take to meet this competition? What part will speed play? Cost?

What contribution must roadway and structures make to these changes in service? What measures can this department initiate to provide "faster" track? Must curvature be regarded in a new light? Will we need stronger tracks and structures? How can this strength be provided? Must the track of tomorrow be maintained to higher standards of line and surface? What will be the effect of the "faster tempo" on the character of water, coaling and sanding facilities? Even if men are available, will the railways be able to afford to do as much work by hand or will there be still further impetus for mechanical equipment?

Yes, I am sure that you agree that the railways will face new problems. I am sure also that you will agree that the engineering and maintenance of way departments will be confronted with their full share of these problems. I believe also that you will agree that it is none too early for the men in these departments to begin to think about how they can contribute to the ability of the railways to meet the changing conditions of the post-war days and to retain as large a part as possible of the gains they have made in handling the nation's traffic since Pearl Harbor.

Yours sincerely,

Elmer T. Howson

ETH:GP

Editor

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THIS LATEST TYPE TENDER

Was Developed to

REDUCE WHEEL LOADS AND TRACK STRESSES

AMONG the important advantages of this newest type tender over the conventional tender design is the fact that ***lighter loads per wheel are obtained*** with more uniform distribution of weight at rail—***wheel loads and track stresses are reduced.***

This design permits greater water and fuel capacity within restricted limits—***weight of tender is reduced*** and increased mileage is obtained between wheel turnings. Operating and maintenance costs are reduced and locomotive availability increased.

For high capacity tenders *specify* **COMMONWEALTH TENDER BEDS.**

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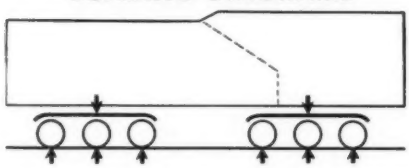
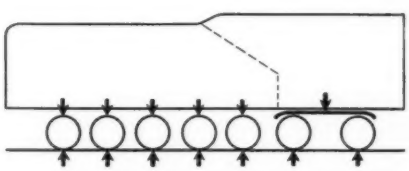


Tender with two 6-Wheel Trucks



Latest Type Tender Using Commonwealth Tender Bed

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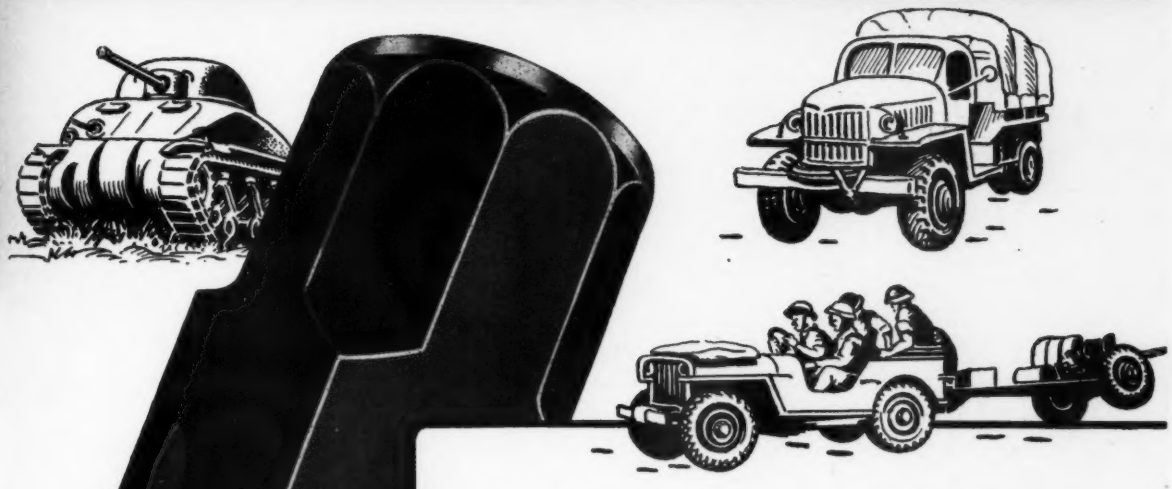
WHY 100% PRODUCTION INCREASE OF

WARREN TOOLS

STILL CAN'T SUPPLY THE DEMAND



★ The next time you see a convoy of Army vehicles traveling down the highway, notice the heavy hand tools each one carries. Multiply those by hundreds-of-thousands of trucks, tanks, jeeps, and armored cars similarly equipped. Then add the tools used in production of raw materials, by railroads, by war industry, for construction and shipbuilding, plus those required by the Army Engineer Corps. When you visualize the staggering amount of Warren Heavy Hand Tools so urgently needed by so many, you will realize our difficulty in maintaining reasonably prompt deliveries under wartime restrictions on raw materials and labor.

In order to serve you better, Warren Tool Corporation has increased production over 100%. However, we still cannot fully cope with demands, so please do your utmost to conserve the tools you have.

Makers of the famous Devil Line of Track Tools

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SEPTEMBER, 1943

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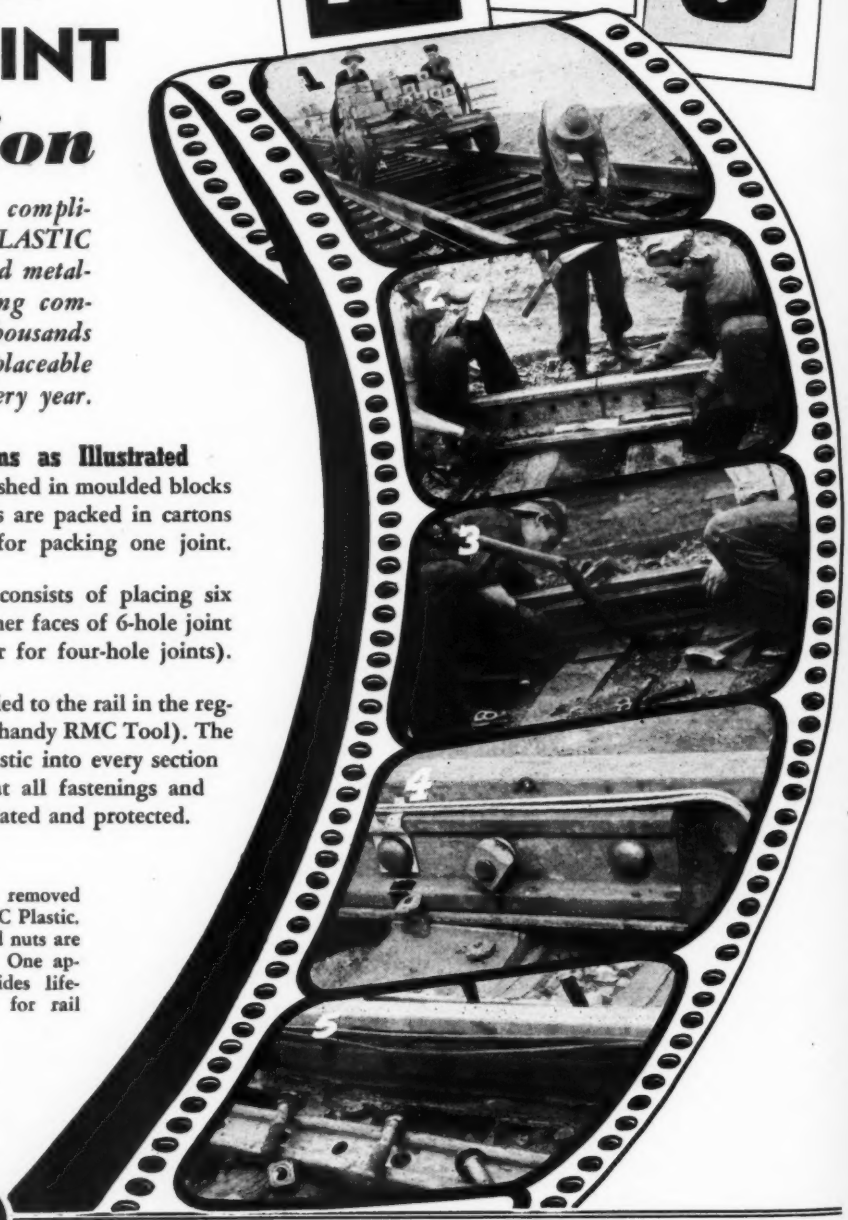
As Simple As A B C

TO STOP RAIL JOINT *Corrosion*

There is really nothing complicated about using RMC PLASTIC . . . the tested and proved metal-preserving and lubricating compound that is saving thousands of tons of practically irreplaceable rail for the railroads every year.



Three Simple Operations as Illustrated

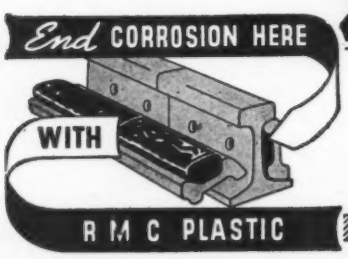
1. RMC PLASTIC is furnished in moulded blocks 12 in. long. The blocks are packed in cartons containing sufficient Plastic for packing one joint.

2. The initial operation consists of placing six RMC blocks on the inner faces of 6-hole joint bars before assembling. (Four for four-hole joints).

3. The joint bars are applied to the rail in the regular manner (with the handy RMC Tool). The bolting action presses the Plastic into every section of the joint assembly, so that all fastenings and surfaces are thoroughly lubricated and protected. (See illustrations 3 and 4).

Illustration 5 shows the splice removed four years after packing with RMC Plastic. Note that rail, joint bar, bolts and nuts are completely free from corrosion. One application of RMC Plastic provides life-long protection from corrosion for rail joints at little cost.

Get a Supply of RMC PLASTIC now — while you can get *All* you need.



RAILWAY MAINTENANCE CORP.

PITTSBURGH **PENNSYLVANIA**

Railway Engineering and Maintenance

Some Facts

About Our Railways

The railways of the United States comprise some 229,174 miles of lines (Jan. 1, 1943). The railways of the world include 788,672 miles of lines (1937). In other words, the United States, with less than six per cent of the world's population and six per cent of the world's land area, has about 30 per cent of the world's railway mileage.

We have a mile of railroad in the United States for every 13 square miles of land area; in the rest of the world there is a mile of railroad for every 100 square miles of land area. There is a mile of railroad for every 563 persons in the United States; in the rest of the world there is a mile of railroad for every 3,628 persons.

Compared with other countries, the railway mileage of the United States is approximately 10 times that of Great Britain, 6 times that of France; 6½ times that of Germany; 4½ times that of Russia; 5½ times that of India; 12 times that of Japan; 21 times that of Italy and 37 times that of China. We have more miles of railways in the United States than in all of South America, Asia, Africa and Australia combined.

126 Tracks Across Continent

Turning from miles of line to miles of tracks, we had 399,627 miles of tracks in the United States at the beginning of 1943. This includes approximately 20,500 miles of second or other multiple main tracks; it includes also all passing and yard tracks, all railway-owned industry tracks and all other auxiliary tracks of the railways. This mileage is sufficient to provide 126 parallel tracks across the continent from New York to San Francisco. If these tracks were extended into one single line, it would take a train, traveling at the rate of a mile a minute, 279 days to run the length of this track.

The ten states having the greatest railway mileage are: Texas, with 15,865 miles; Illinois, with 11,777 miles; Pennsylvania, with 10,088 miles; Iowa, with 8,906 miles; Kansas, with 8,479 miles; Ohio, with 8,435 miles; Minnesota, with 8,371 miles; New York, with 7,664 miles; California, with 7,524 miles; and Michigan, with 7,176 miles. These figures are as of December 31, 1942, and do not include switching and terminal companies.

Serves Every Corner of the Country

This is the railway network of the United States; it penetrates every corner of this country; it makes every hamlet a suburb of the metropolitan centers; it brings the produce of the farms to the centers of consumption in the cities and the ores from the mines to the nation's smelters and mills. By the scope of its service, it has made possible a prosperous, virile nation.

And in a period of emergency such as that through which we are now passing, this same network of railways rallies to the nation's needs and carries not only the traffic that normally falls to its lot but also much of that diverted from less well prepared and less stable agencies of transportation. The railways of the United States lead the world in the completeness of their coverage as well as in the quality of their service. Their record in these war-time days adds lustre to the time-honored statement that "it's great to be a railroad man."

Rail Sections—

Should Be Reduced Still Further

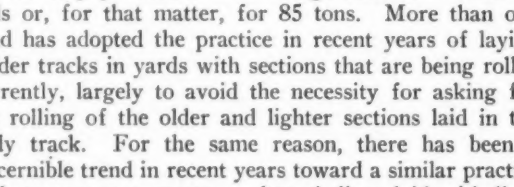
ALMOST ten years ago *Railway Engineering and Maintenance* published a series of articles dealing with the simplification of track materials and tools. In one of these articles it was shown that at that time there were 69 different weights and more than 400 sections of rail in the main tracks of the Class I roads. Obviously, so far as current renewals were concerned, all but a relatively few of these sections were obsolete; yet it was also shown that one producer was then maintaining rolls for 140 sections of rail, in 24 weights, ranging from 65 to 152 lb. Although the number of rolls was less at the other mills, the same situation existed at all of them, and some had rolls for sections that were not being rolled at other mills.

In the intervening years many of these older sections have been released from main-track service and relegated to sidings or yards, and a few have disappeared in the intensive scrap collections that have characterized the last two years. As a result, today, all of the mills combined are maintaining rolls for only 61 sections in 21 different weights. During the last two years only 45 of these 61 sections were rolled, and as before, some of those rolled were used for the manufacture of frogs and switches.

Furthermore the requirements for some of the sections lighter than 100 lb. ranged from as little as 85 down to 6 tons in an entire year.

In these days when men are scarce and every minute counts in the war effort, it is an imposition to require a mill to stop production and change rolls for 6 tons of rails or, for that matter, for 85 tons. More than one road has adopted the practice in recent years of laying ladder tracks in yards with sections that are being rolled currently, largely to avoid the necessity for asking for the rolling of the older and lighter sections laid in the body track. For the same reason, there has been a discernible trend in recent years toward a similar practice with respect to turnouts on branch lines laid with light rail.

There is economic justification for this practice, both in yards and on light-traffic branches, for the turnout is recognized as the weakest part of the track, which should be strengthened by any means within reason. In addition, every trackman is familiar with the difficulties that attend the effort to maintain turnouts laid with light rails of obsolete design. Most of these rails are low and have thin bases and it is difficult to obtain plates, braces and other accessories. Furthermore, while engine restrictions may have been placed on the line or the ladder, similar restrictions cannot be made with respect to cars, some of which may tax the turnouts more severely than some of the locomotives that have been barred from service.



There is little question that a considerable number of remaining sections can be given up without detriment to railway operation and with benefit to the railway that does so and to the entire industry. This is a subject that warrants serious study and unbiased thinking.

Work Equipment—

Must Be Used Even More Intensively

RAILWAY men have revolutionized many classes of track and bridge and building work through the development and use of power tools and machines during the last twenty-five years. This has contributed so directly to speeding up operations, improving the quality of the work done and reducing costs that it possibly outranks any other development in maintenance methods or practices during this period.

In spite of the outstanding value of this mechanization of many operations, the question has often been raised whether maintenance men are securing the maximum output from their machines—a question which is particularly pertinent at this time when most roads are undertaking the largest maintenance programs in many years, have insufficient equipment to do the work, and are faced with the difficulties, if not the impossibility, of securing additional power tools and machines.

It cannot be denied that in the past some maintenance officers have given too little thought to getting the maximum output from the the equipment that has been purchased to assist them in their work. While they have employed their equipment intelligently while in use, and, unquestionably, have produced more and better work, with economy, than could have been produced by hand methods, they have overlooked the largely increased output and economy possible through the more intensive use of this equipment.

Where there has been an effort to get more out of work equipment in the past, and many maintenance officers have made that effort, it has generally taken the form of improved organization, prolonging the working season or purchasing multiple-purpose machines, although some have not overlooked the possibilities in shifting their equipment from gang to gang and from territory to territory as the season progresses, and even of turning units of equipment over to other departments for use when the maintenance department, because of climatic or other conditions, cannot make effective use of it. Today, all of these measures must be adopted to get the greatest output from the equipment at hand or that becomes available. Until maintenance officers have gone the practical limits in these respects, their arguments for additional equipment under the circumstances which make such equipment difficult to secure today, are weakened.

And beyond these measures, maintenance men must give greater consideration to double and triple-shifting their equipment in order to increase its output. Admittedly, many classes of maintenance work, especially on the track, can be done better during the daylight hours than after dark, and to extend certain classes of work beyond the daylight hours seems impracticable. Admittedly also, the present labor situation, with its shortage of men, and especially of machine operators, adds to the difficulties of

double or triple shifting equipment, but it is inconceivable that more than eight or ten hours effective use cannot be made daily of at least some of the equipment now employed in maintenance operations—especially during the season of long daylight hours.

It has already been demonstrated on several roads that some operations and equipment are adapted to double and even triple shifting, for on these roads tie tampers, tie cutters, grading equipment, mowing machines and welding equipment have been employed fourteen or more hours daily. It is beside the point that this practice presents problems beyond those encountered in one-shift work where it increases production with the equipment and force available. These additional problems create another challenge to the resourcefulness and ingenuity of maintenance officers.

Two Accidents—

Constitute a Warning to Supervisory Officers

LAST summer a passenger train operating on a high speed main line a short distance west of St. Louis ran into a gang of track men, killing ten. Early this month a high speed passenger train on another railway a short distance east of St. Louis ran into another track gang, killing nine men. Both of these gangs were engaged in surfacing track with mechanical tampers and the men apparently did not hear the approaching trains. From the information available, it appears that neither gang was protected, at the moment at least, with "lookout" men. In this respect they violated one of the most elementary but important rules of safety. With two accidents of such seriousness occurring within a distance of 100 (air-line) miles, one may properly inquire how widespread the neglect of these precautions may be on the railways generally.

As the use of work equipment in maintenance of way becomes more widespread, it is axiomatic that methods of working must be revised to take into account the change in conditions inherent to the operation of this equipment. With tie tampers, a certain amount of noise is involved in the operation of the equipment and this noise not only distracts the attention of the men from other activities but actually prevents them from hearing approaching trains. This condition is, of course, accentuated by the increasing speed and frequency of many passenger and freight trains in recent months.

The use of mechanical tie tampers in track work is no longer open to question; their efficiency has been demonstrated and their use will expand. The problem confronting maintenance officers is to so use this equipment as to secure maximum results from it and to so surround its operation with precautionary measures as to introduce no new hazards.

The accidents referred to indicate a lapse in these precautions. As such they constitute a warning to every other supervisory maintenance officer to survey his practices to insure that similar lapses do not exist and are not being condoned among his forces. Shortages of labor, large turnovers in forces, inadequacies of materials and other baffling problems that all but overwhelm these officers today cannot be allowed to displace the attention to safety that is of primary importance at all times and even more essential in these days when so many inexperienced men are at work.

Crossties—

Shortage Is Added Reason to Protect Them

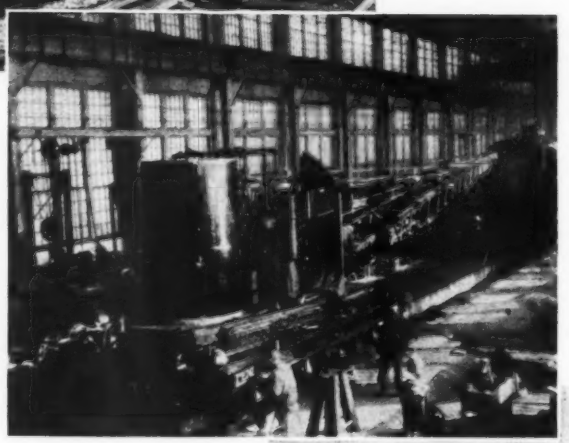
THE railways face a serious shortage in crossties in 1944; in fact, many roads are short of ties for their 1943 replacements. This situation presents a very practical problem to every supervisory track maintenance officer, down to and including foremen.

To the man in the field, the specific reasons which make it impossible for the railroads to secure enough ties for current and 1944 renewals are of secondary importance. It is sufficient for him to know that the stocks of ties on hand are far below requirements, with production still below normal in most tie producing areas, and that, as in the case of so many other track materials, he must plan to make the most of the situation. To do this calls for the employment of every means to prolong the life of existing ties in track, and the most effective use of all new ties that become available, in strengthening the track.

In prolonging the life of existing ties in track, there is little new that can be suggested to experienced track men, who over the years have developed increasing respect for their ties, especially those that are treated. They know that care and skill must be exercised in spiking to prevent damage to ties, if not destructive splitting; that all old spike holes must be plugged; that all newly-adzed tie plate seats and tie surface damaged by derailments, must be protected with a liberal coating of preservative; that ties must be spaced properly to avoid throwing a destructive load on some of them, but that necessary respacing must not be done by driving them laterally with spike mauls or sledges; that care must be taken to prevent battering the ties when tamping, or spike killing them when shimming; and that the proper maintenance of an adequate number of anti-creepers will prevent rail movement and gage distortion, precluding much unnecessary spiking. But they must not forget the fact that the thousands of new and inexperienced employees now engaged in track maintenance do not know these things, and that ignorance or neglect on their part will hasten the premature destruction of thousands of ties unless these new men are instructed in proper methods and then supervised closely.

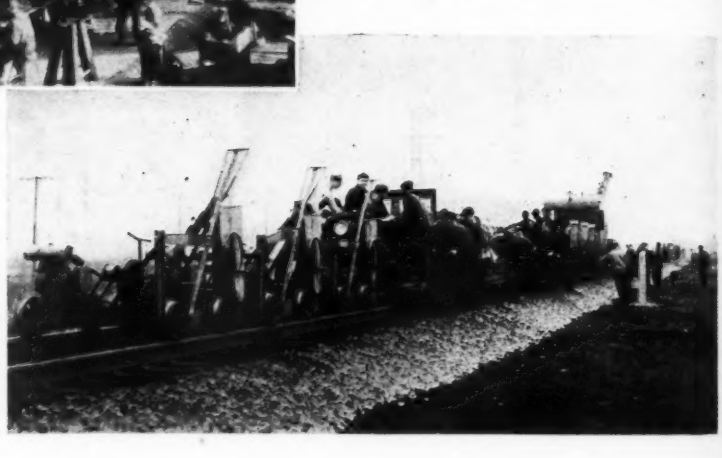
Most track maintenance officers appreciate fully the importance of good drainage to a stable track structure. Today, they must seek also in good drainage the added value of preventing premature softening and decay of their ties. That this is not being entirely overlooked is evidenced by the large ditching, right-of-way sloping, ballasting and ballast cleaning programs that are now under way on many roads—in some cases, on roads that neglected these classes of work seriously during the depression. Only by such measures, in addition to exercising the greatest care in selecting those ties to be replaced, can maintenance men hope to avoid serious weakening of the track structure in the face of the certain tie shortage ahead. Where any of these factors are being overlooked, it is important that they be given immediate attention.

How the Pennsylvania Maintains



Top—Field Supervision and Training of Operators Are Emphasized. Center—Several Maintenance Cranes and Two Wrecking Cranes Under Repair in East Bay of Main Erecting Shop. Bottom—A Rail Laying Equipment Train Clearing Track at Close of Work

When a machine is shipped to or turned over to another division, it is given a careful inspection before it is shipped, and again when received. Field repairs to machines are made by division work equipment maintainers, who are also required to inspect the machines regularly at various intervals, depending upon the importance of the machines, and to train the operators. When the machines need



THE system of work equipment supervision, maintenance and repair used on the Pennsylvania is designed to insure maximum production from its work equipment. This system has three objectives: (1) To have the equipment in good repair when the working season starts; (2) to keep it working as large a part of the time as possible by careful inspection and repairs in the field; and (3) to train and supervise the operators to care for their machines properly and get the most out of them.

General Organization

Maintenance of way and structures work on the system is under the general direction of the chief engineer-system, the assistant chief engineer-maintenance, and the chief engineers maintenance of way of the Eastern, Central and Western regions and the New York zone. Most of the equipment is assigned to individual divisions and is under the direct supervision of the division officers, with provision for regional and system control and with co-ordination of field repairs made by maintenance of way forces and shop repairs made by the mechanical department. The location and condition of the machines at all times are known and are kept up-to-date by an effective system of reports.

In addition to the general supervisory set-up, one of the most important groups in the organization for the maintenance of this equipment is the Maintenance of Way Machinery Committee made up of a representative of the chief engineer, and of each regional chief engineer maintenance of way, headed by the engineer of tests-maintenance of way. This committee meets once a month, studies all problems in connection with the use and repair of work equipment, and submits its recommendations to the management for consideration. If approved, the recommendations are adopted. The committee also passes on all maintenance equipment offered to the railroad, basing its decisions upon the need for the equipment, its practicability and in many instances upon actual tests conducted under its supervision. It also has direct supervision of the Manual of Instructions, Maintenance of Way Equipment.

complete overhauling or repairs that cannot be made in the field, they are forwarded to maintenance of way equipment repair shops, located at Altoona, Pa., Renovo, Pa., and Ft. Wayne, Ind. Renovo makes repairs to all equipment in use on the Eastern region, the New York zone and that part of the Central region east of Pittsburgh, Pa.; the Ft. Wayne shop repairs all equipment on the Western region and the Western part of the Central region; the Altoona Works repairs gasoline-driven electric power units and tools. This arrangement divides up the work, and yet gives it a high degree of centralization.

Training Operators

Probably the most important problem in obtaining the most effective use of work equipment is that of securing

Its Work Equipment and Supervises Its Use

An article describing the system of work equipment repair and supervision employed on the Pennsylvania to insure maximum utilization and efficiency from the large amount of work equipment this road possesses. This system includes a program for the complete shopping of all units that do not measure up to the efficiency required. Special attention is given to field inspection and repair and to the training of operators, many of whom are new, to keep the machines functioning efficiently during the working season

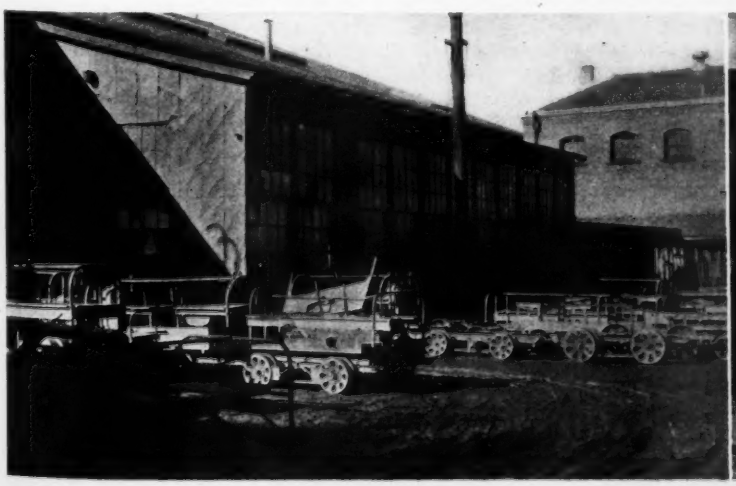
and training new operators. This is a real problem and this training requires more effort than in previous years when fewer were required and few were trained each year.

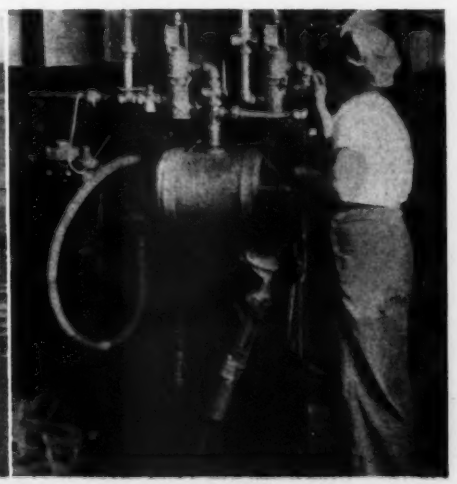
The operators of work equipment on the Pennsylvania are divided into three classes: work equipment engineers Class I, work equipment engineers Class II, and machine operators; these gradations depend upon the types of machines operated, the skill required to handle them and the types of repairs and adjustments they are permitted to make. The machine operators are used on the smaller machines, which require the least skill to operate and keep in good running condition; these include adzing machines, drills, mowers, rail saws, air compressors, gasoline-operated concrete mixers, electric generators, etc. These operators are selected from the section forces, and although the positions are open to bid, the operators must qualify by showing that they have some knowledge of machinery and can attain skill in handling the units.

Before a new operator is allowed to operate a machine, he is instructed in its use by one of the division work equipment maintainers, who stays with the operator until he has acquired skill in handling the machine. The operator is also instructed how to maintain his machine in good working condition and to make minor repairs. He is not required to know how to make important repairs and adjustments, but is required to know when such repairs and adjustments are needed and to arrange for assistance, when needed, from a division work equipment maintainer. He must familiarize himself with all parts, adjustments and the proper lubrication and maintenance of the machine assigned to him. He must also provide himself with all necessary lubricants in accordance with instructions and have the proper equipment for handling and applying them. He is then given a manufacturer's instruction book and parts list for that machine, which list is returned to the proper division authorities whenever the operation of the machine is suspended and is sent to the shop with the machine if shipped in for overhauling.

The machine operators assist the division work equipment maintainers make repairs when they are necessary, and in that way learn more about their machines and their repair, enabling them to qualify eventually as work equipment engineers. Their initial instruction is also followed up, periodi-

Left—Motor Cars Awaiting Repair. Right—One of the Women Employees in the Ft. Wayne Shop at the Testing Apparatus for Pneumatic Tie Tampers and Spike Drivers





cally, by the maintainer during the course of his regular inspection of machines, and by supervision from the track supervisor, division engineer, and others who check their performance.

Work equipment engineers Class I and Class II are required to make nearly all adjustments and repairs that can be made by one man and to keep a reasonable supply of tools for that purpose. On heavy repairs, they are assisted by the division work equipment maintainer, and when their equipment is sent to the shop, they frequently accompany it to assist in overhauling to learn more about the machines in their care. This practice also promotes better understanding between the field and the shop forces and enables the work equipment engineer to test and tune up his machine before it leaves the shop.

Class I work equipment engineers in general are assigned the largest and most complex units of equipment, those requiring the most skill to operate and keep in good running condition, such as large ballast cleaners, ballast cleaning moles, ditcher-spreaders, pile drivers and power machines used for excavating and handling bulk materials. Class II work equipment engineers are usually assigned to less complex equipment, such as ballast discers, rail laying cranes, weed burners, steam-operated concrete mixers and cranes equipped with hooks rather than buckets, etc.

Maintainers Are Key Men

The division work equipment maintainers, of which there are one or more on nearly every division, are the key men in caring for the work equipment in the field. In addition to training the machine operators and work equipment engineers to increase their efficiency and knowledge of the machines, they are required to maintain all work equipment in the field, so far as possible, and make frequent inspections and submit reports on the machines under their jurisdiction. For example, they are required to inspect and report the condition of each air compressor, Syntron power unit and mole ballast cleaner every 2 weeks, of each crane and truck every 30 days, of all motor cars every 60 days and of all push cars every 3 months.

In addition to the regular division work equipment maintainers, each of the rail-laying trains, which operate under regional supervision, has assigned to it a separate work equipment maintainer and helper.

Manual of Instructions

All of the maintainers, operators and work equipment engineers are guided by a Manual of Instructions which is published in loose leaf form, handy pocket manual size, and is kept up-to-date by recommendations of the work equipment committee, approved by the chief engineer. This manual provides detailed instructions for the care and operation of nearly every type of equipment used on the system. One section is devoted to internal combustion engines; the manual also contains special instructions on Diesel engines, tie adzing machines, ballast cleaning machines, steam boilers, buckets, cables, dump cars, motor cars, air compressors, cranes, discers, drills and grinders, electric generators, flexible shafts and attachments, pneumatic tools, track lubricators, weed mowers, weed burners, pile drivers, spike pullers, crawler tractors, automobiles and trucks, oxy-acetylene equipment, power wrenches, etc.

In the section on internal combustion engines, the Manual of Instructions contains a chart which lists the various symptoms a motor will show if something is wrong, the probable cause, and a code number which indicates whether the repairs should be made by the machine operator or the division work equipment maintainer. The manual also contains several other tables, including a table of types and makes of spark plugs classified for hot, medium hot, normal and cold engines; a classification of motor cars, indicating capacity, model and type of engine; and a simplified lubrication chart, indicating the proper lubrication of various types of bearings and moving parts and of types of engines, with the storehouse reference number of the proper lubricant.

Reports

In addition to the regular reports of the division work equipment maintainers, previously mentioned, the Pennsylvania has a system of other reports which enable the maintenance supervision to know from day to day where each machine is, what it is doing, the hours worked, and the work performed. A Daily Report of Maintenance of Way Machine Operation is used, in general, for all equipment and is made out each day by the machine operator and sent to the chief engineer maintenance of way of the region. In addition to the above mentioned information, this report gives the operator an opportunity to report defective conditions, in which case the necessary action is taken to see that repairs are made, after which the reports are forwarded to the accounting department.

The operators of automobile trucks, rail-highway trucks and highway truck-cranes make out a special daily report, which shows such special information as the use of the particular equipment, number of trips, miles traveled, hours spent in traveling and in loading and unloading, the consumption of fuel and lubricants and repairs needed.

Another report, which is submitted monthly, is on Rail End Welding and Grinding, which provides space for the tabulation of all expenses incident to these operations and provides a means for determining unit costs.

These reports, combined with the various reports submitted periodically by the division work equipment maintainers, provide a complete record and check of each unit of equipment. A study of the reports will also indicate whether full use is being made of the equipment, and, if not, the units are transferred to other work to secure the proper return on the investment.

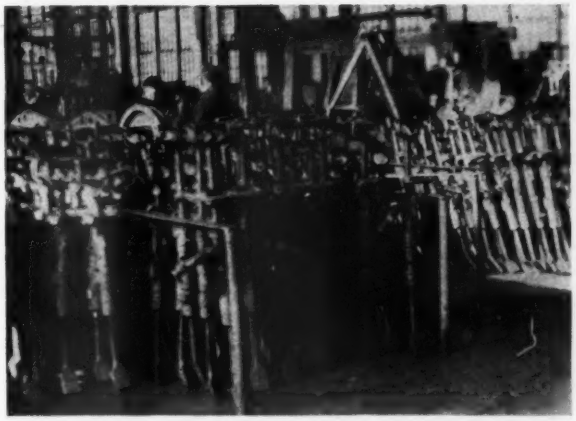
A M. of W. Truck Recently Purchased Second Hand. It Was Equipped With a New Stake Body and the Motor With a New Block and New Head

Shop Repairs

It is the policy of the Pennsylvania each fall to check all equipment carefully at the close of the working season and prepare a program for shop repair to be completed before the next working season. Equipment requiring minor repairs is repaired locally by the division work equipment maintainers and stored on the division, while equipment requiring overhauling is scheduled for repair at Altoona, Renovo or Ft. Wayne. This carefully

prepared schedule is designed to prevent overloading the shops and to allow some leeway for emergency and current repairs of motor cars and other equipment used the year around.

The shops are equipped for repairing or rebuilding anything from a magneto up to a wrecking crane or locomotive. The program of work equipment repair has scheduled the shops to capacity. Renovo is also required to handle back shop repairs to locomotives and a large amount of camp car repair work. Although the number of shop employees was increased at Renovo, this shop could not complete all of the additional work and keep up with its schedule of work equipment repair work. For that reason, some of this work was shifted to Ft. Wayne, although that shop has also been required recently to overhaul K-4 type locomotives, in addition to its work equipment repair work. As a result, the Ft. Wayne shop worked on much of the Central region work equipment and even some of the Eastern region work equipment last winter, in addition to the Western region equipment scheduled for repair. The following discussions of shop repair work will be confined to the methods and equipment used at Ft. Wayne, for all types of work.



Pneumatic Tie Tampers Awaiting Test Before and After Repairs

A Group of Weed Mowers Ready For Shipment After Repair

Ft. Wayne Shop

The shop at Ft. Wayne was formerly a completely-equipped back shop. Gradually, however, major locomotive repairs for the Western region were transferred to Columbus, Ohio, and the shop was converted to a maintenance of way work equipment repair shop, in which capacity it has functioned for a number of years. It includes facilities and personnel to handle boiler, forge, machine shop, pipe and sheet metal work. It also has a cabinet shop, air brake shop, motor car shop and complete facilities for the repair of internal combustion engines and for gas and electric welding.

At the present time the Ft. Wayne shop is employing about 300 men and 50 women. The women are used ordinarily in routine tasks as helpers, for cleaning up and sorting scrap, in the storeroom, and for handling materials, although some of them are drill press operators; one operates a large steam hammer and another tests the pneumatic tools before and after repair.

When the maintenance of way machines are sent to the shop they are first given an operating test, if possible, and on the basis of this test and the latest field inspection reports, sent in with the machines, the necessary repairs are determined. Air compressors are given a multiple-orifice test to determine their efficiency, motor cars are placed on a test rack, and air tamping tools are tested on an air testing machine to determine the rate of air consumption. If the units test close to the requirements for efficiency or rated power, they are given light repairs and adjustment; otherwise, they are given a complete overhauling. As an indication of the standard required, compressors must develop at least 95 per cent of their rated capacity or they are not permitted to leave the shop. If they are completely overhauled, 100 per cent is required. This efficiency is checked by the multiple-orifice test in which each orifice is calibrated on a flow meter.

The shop has its own storeroom, in which a large number of ordinary parts that constantly need replacement are stocked. The storekeeper orders a certain number of such parts periodically if his stock is depleted below certain limits. Large or seldom-needed repair parts are ordered specially when field inspection reports indicate that a machine will soon need major overhauling, so that they will be on hand by the time the machine is sent to the shop. Ordinarily, a large machine, such as a crane, is not sent to the shop until all repair parts have arrived, unless a complete breakdown occurs. Although repair parts have been harder to get and their delivery is now somewhat slower than formerly, most repairs have been handled satisfactorily by using a little foresight in ordering repair parts in this manner. In the case of a complete breakdown, the shop can make makeshift repairs, if necessary, which will put the machine back into operation. Sometimes welding repairs are made to large gears and even engine blocks may be welded, if absolutely necessary, although this requires very skillful welding and afterward the cylinders must be checked carefully and usually rebored, before returning to service.

Although the winter is the heavy repair season at the Ft. Wayne shop, there is a constant flow the year around of such equipment as motor cars, and other units that are not seasonal in use. A separate motor car shop occupies a part of the cabinet shop, and is arranged with a U-shaped production line; it has a capacity of 20 motor cars per week. When a motor car is sent to Ft. Wayne for repair it is unloaded in the yard outside the motor car shop. When it is ready to go into the shop it is tested and the motor is then stripped from the car

(Continued on page 666)

Making Rail Last Longer*

Every Known Method Must Be Employed to Increase the Life of Rail in Track, and New Ideas to This End Must Be Developed

THE prolongation of rail life has always been of paramount importance; now, as never before, it is imperative. At no time in our history has track been called upon to handle such heavy and exacting traffic as it is at this time. If we can expect to secure only 50 per cent of the tonnage of rail per ton-mile of freight hauled, as compared with that installed during the preceding 20 years, it is a challenge to us to use every known method to increase the life of rail in track, and to endeavor to develop new ideas for doing so.

To increase the life of rail, we must begin with the unloading operation. In this work cranes or other suitable methods of handling should be used so the rail will not be bent or damaged. The next operation that affords us an opportunity to do things that will help to prolong the life of rail is that of placing it in the track. In laying rail, quality of work, not quantity, should be the primary consideration.

Immediately prior to laying the rail, the angle bars, and the rail ends within the limits of the angle bars, should be lubricated with oil containing graphite, or, as the angle bars are applied, lubricating packing should be installed, the purpose of both measures being to avoid frozen joints. Such joints result in improper rail expansion; this, in turn, causes battered rail ends at one joint, and chipped rail ends at another. In this connection, the application of sufficient rail anchors is necessary, and these should, of course, be applied before any traffic is allowed over the rail. To insure that the proper expansion gaps will be left at the joints, expansion shims must be used, the thickness, of course, being dependent on the rail temperature. Experience has shown that, if proper track fixtures are used, the thickness of the expansion shim, when laying the heavier sections of rail, should be approximately two-thirds that called for by the usual tables.

"Taking Care" of the Rail

Immediately after laying the rail, all loose ties should be tamped to avoid bent rails. Regardless of whether the track appears to be in good surface prior to the laying of the rail, loose ties are always found. New rail should not be laid too far in advance of the time of "taking care" of it. Included in this work is the cleaning of the ballast, either by hand or by mechanical means, giving attention to that between the rails as well as in the shoulders and the inter-track spaces. Necessary tie renewals are now made, and the ties properly spaced, after which the track should be given a general raise, usually being tamped with forks or picks. The height of the raise will depend on local conditions.

Concurrent with the raising operation, the track on both tangent and curves must be placed in proper alinement, and the correct elevation of the curves established, which should be done by engineers fully conversant with this type of work. Side wear on the ball of the rail is greatly increased if the track is not in the proper alinement, or if curves are not elevated the right amount for the speed at which trains are operated. In one or two weeks after the general raise has been made, the tracks should be inspected, and any low spots and loose ties that have developed under traffic should be raised to grade and properly tamped. However, despite the precautions described above, ties will become loose and low spots develop after several months. This condition usually develops during the year after the rail has been laid, and at that time the track should again be given a light general raise and the ties tamped uniformly, using mechanical tampers.

If track is given the treatment outlined above, and if adequate drainage is provided in both cuts and fills, the rail, with the exception of the rail ends and on the sharper curves, will remain in good surface and alinement under severe traffic, with a minimum of rail wear, until the ballast again becomes foul.

Protecting Rail Ends

To prolong the life of rail ends and, hence, that of the rail itself, various means are necessary. If the rail ends are not beveled at the mills, this should be done by means of proper grinders or slotting machines immedi-

*A paper presented before a recent meeting of the Metropolitan Maintenance of Way Club, New York.

New rail that is being made available to the railroads is not sufficient to compensate for the toll in rail life being taken by the record traffic now moving. This situation constitutes a challenge to track men to get the maximum possible life out of the rail they have, and this discussion seeks to outline what can be done to meet this challenge.

By Blair Blowers

Acting Engineer Maintenance of Way,
Erie, Youngstown, Ohio

When Unloading Rail, Cranes or Other Suitable Methods of Handling It Should Be Used So that the Rail Will Not Be Bent or Damaged

ately after the rail has been laid. Thereafter, to prevent the development of overflow, which eventually leads to chipped ends, the rail ends should be beveled at intervals, depending on the character and volume of traffic. Care must be exercised in performing this work to avoid cutting too far back on the top of the rail, thereby causing increased rail-end batter. Battered rail ends will occur, although rail-end hardening at the steel mills is beneficial as a means of reducing it to a minimum. However, the batter must not be allowed to become excessive before action is taken to correct it. The building up of the rail ends by adding new metal, while at the same time reforming and grinding them, will add several years' life to the rail in heavy-duty tracks.

Continual progress is being made in the design of angle bars. The joints, however, still remain the weakest point of the track structure and must receive particular and constant attention. When new bars are applied, care must be exercised to see that they are in the proper position to support the rail ends and are in contact with the rail surfaces in the manner required by the particular design. Bolts must be tightened to a uniform tension, but not over-tightened. A regular program must be maintained for tightening track bolts, and for inspecting rail joints for proper fit. Cocked joints, it must be remembered, cause undue wear of both the angle bars and the rail. When the angle bars become worn to such an extent that the rail ends are not properly supported, they must be renewed.

Many roads are re-forming the old angle bars with good success, adding metal and grinding them to fit the contact points of the rail. Re-formed bars from the steel mills can still be obtained, as well as new angle bars for renewals. Money spent in the reforming of angle bars and the purchase of new bars is a good investment, and many miles of rail will be continued in service in heavy-duty main tracks that otherwise would be relegated to tracks of lesser importance. Of course, when it can be applied successfully, the continuous butt-welding of rails has the effect of eliminating wear at the rail ends.

Rail wear on curves is one of the greatest enemies of rail life, and much can be done to retard this type of wear. Under certain traffic conditions, and if the wear is not excessive, the rails on the high and low sides of the curve can be transposed. With the heavier rail sections, the high rails on curves can be turned end for end. This must be done before the wear becomes too great and before the

Clean Ballast and a Proper Track Surface Are Essential to Protect New Rail Against Damage Or Excessive Wear

track gage has widened sufficiently to cause the low rail to become flattened. If the turning of the high rails is done at the proper time, the rails on both sides of a given curve will wear out at about the same time. This expedient has been used successfully even on sharp curves, as the rail will conform to the proper curvature without any kinks developing in the alinement.

One of the best methods of retarding rail wear on the high side of curves is by rail lubrication. When installing lubricators, careful study must be given to the matter of locating them properly. Even then, in many instances, it will be necessary to re-locate them in order to provide adequate lubrication. It is important that a lubricant be used that, when picked up by the wheels of passing trains, will not be thrown off quickly, and yet will adhere to the ball of the rail as the wheels deposit it. Proper maintenance of the lubricators is necessary if the best results are to be obtained. This work should be done by a man especially trained in the maintenance of rail lubricators, rather than being entrusted to the average track foreman.

Other Measures

Of no less importance in prolonging rail life, other than the care of the rail ends and curtailment of wear on curves, is the constant care of the track surface and alinement; also the periodical complete cleaning of the ballast and the general resurfacing of the track. The intervals between complete reballasting operations will vary with traffic and other conditions, but must be such that the work will be carried out when the ballast becomes foul, thereby impeding proper drainage of the track structure. This work should be done where the track has older rail, as well as where the rail has been laid recently, as soon as the ballast becomes dirty and without waiting until the dirt has churned into mud.

Serious damage can occur to the rail and track fastenings on tracks that are subject to brine drippings. This can be retarded by an out-of-face application of oil to the rail and track fixtures, the oil being applied to the entire surface of the rail with the exception of the ball. Between applications of the oil by the out-of-face method, the joint bars should be kept well oiled, particularly on their back sides. This tends to prevent corrosion, lessen rail wear and prevent frozen joints.

Last, but not least, we must bear in mind that the methods we have mentioned are equally applicable to rail in sidings and yards and should be so applied.

There are many ways in which to show one's patriotism. One of the important ways, for all track men, is by exerting earnest and intelligent efforts to prolong the life of rail now in track to the maximum extent

Should Piles Be Spliced?*

By A. E. Bechtelheimer,
Engineer of Bridges,
Chicago & North Western, Chicago

FOR purpose of this discussion, a blocked pile is one that has had 6 to 12 in. cut from the top, the cut portion being replaced with a square timber laid flatwise directly under the cap. Similarly, a stubbed pile is one that has been cut off from 6 to 12 in. above ground or at varying distances below ground, the portion above the cut being replaced with a section of sound pile; the cut is made at right angles to the axis of the pile. Likewise, a spliced pile is one that has been cut off at some points either above or below the ground, a part of another pile being inserted as a substitute for the section that has been removed. Details of splicing vary, depending on local conditions and on the individual preference of the foreman or supervisory officer responsible for the work.

In considering the splicing of piles in timber trestles, the following general conditions must be noted and taken into account in reaching a decision:

1. Whether the piles are decayed at or near the ground line; but are practically sound at a depth that can be reached without excessive excavation.

2. Whether there is probability of scour that would expose the piles below the ground; also whether there is probability of drift at high-water stages.

3. The probability of sliding banks that might throw the bent out of plumb.

4. Height of bulkhead at end bents, and the likelihood of excessive pressure tending to crowd the bent.

5. Height and length of the bridge.

6. Density, weight and speed of traffic on the line.

7. Grade and alinement over the bridge.

8. The service life remaining in the structure as a unit, and the general policy relative to the future requirements of the bridge.

Where the general conditions are favorable, it is good practice to block, stub or splice piles in the bents. It is a safe and practicable procedure, quite economical compared to redriving the individual piles or framing bents, and is a satisfactory means of continuing a bridge in service until other piles in the bridge have given maximum service.

Where conditions 1, 2, 3, and 4 are favorable at a bridge on tangent, which carries low-speed traffic and is less than 15 ft. high, it is permissible to stub and splice all piles in a bridge of 12 to 15 spans, and from 60 to 75 per cent of the piles if the bridge is of more than 15 spans. For bridges between 15 and 26 ft. in height, additional piles should be driven before stubbing and splicing all piles in a bent. All bents in such a bridge may be handled in this manner. If the bridge is on a curve, it will require special treatment, for which reason a general discussion is not applicable.

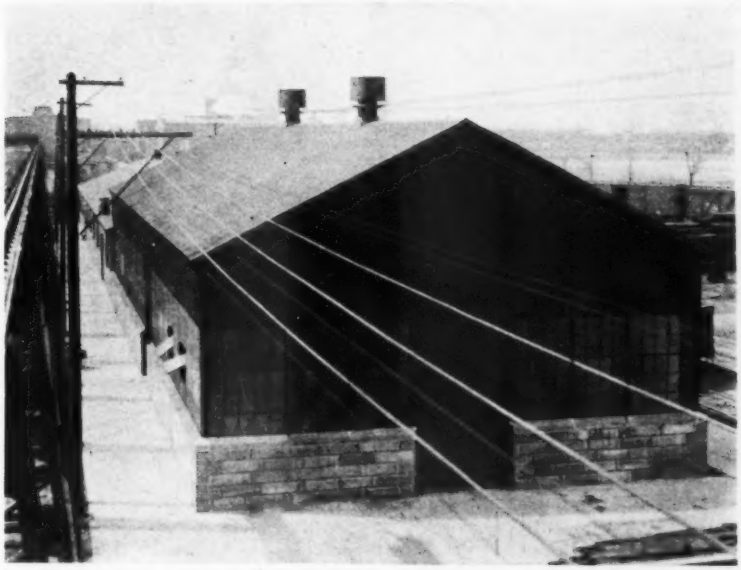
Where the same four conditions are favorable at a bridge on tangent, which carries main-line traffic, and is less than 15 ft. high, it is permissible to stub and splice 60 per cent of the piles in a bent or in the bridge as a whole. Bridges more than 15 ft. high and those on curves should receive special consideration when it becomes necessary to stub or splice more than 40 per cent of the piles in a bent or in the bridge. In addition, special conditions, including curvature, grade and traffic, may make it inadvisable to splice or stub the piles in a bent without driving additional piles to strengthen or stiffen the bent.

*This discussion was submitted as an answer to a question regarding the splicing of piles in pile trestles which appeared in the February issue. Because of its scope, it was withheld for publication here as an independent article. For further discussion of the subject see page 292 of the April issue.

Materials for Victory

No. 11 of a Series

To house its system reclamation activities at Silvis, Ill., in a new structure and to centralize this work in one building, the Rock Island recently completed a new reclamation shop, which, because of wartime conditions, was constructed almost entirely without using new or critical materials



This End of the Shop Is Built of Second-Hand Corrugated Iron Above a Tile Base

Constructs Reclamation Shop

With Second-Hand and Non-Critical Materials

THE CHICAGO, Rock Island and Pacific recently completed the construction of a new reclamation shop at Silvis, Ill., to provide better housing in one building for its system reclamation work and to centralize these activities, which were formerly housed in a number of dilapidated sheds. A feature of this new reclamation shop is that it was constructed, so far as possible, entirely of second-hand, reclaimed scrap or non-critical materials. The work carried on in this building consists of the reclamation or repair of spikes, bolts, nuts, rail anchors, shovels, brake beams, hose mountings, lamp and tinware, the cleaning of cement sacks, etc. One end of the shop is also used for the fabrication of steel for building work and other uses from scrap steel angles, channels and plates.

The building is a one-story structure, 302 ft. 7 in. long and 43 ft. 6 in. wide, and is located paralled to and on the north side of the scrap yard east of the general storehouse at Silvis. In plan, it has a single long room for the reclamation work, which occupies all except 40 ft. on the west end of the building, where a locker and lunch room, 27 ft. by 40 ft., and a wash and toilet room, 16 ft. by 40 ft., are located. From a construction standpoint, the building may be divided into two parts; the easterly end, 121 ft. 3 in. long, is higher and is primarily a second-hand corrugated iron structure; the remainder is essentially of tile and brick construction. Both parts of the building have monolithic concrete foundations and floors supported on a rolled cinder fill. To simplify the description of its construction, the corrugated iron portion and the remainder of the building will be discussed separately.

Used Electrical Conduit Tile

The westerly part and up to the window level of the easterly or high part of the shop has side walls constructed of electrical conduit tile, a large number of which had been purchased by the railroad at a reasonable price some time previously and subsequently rejected for their originally intended use. These tile are 11 in. by 11 in. by 36 in. long and weigh 150 lb. apiece, one tile in place being equivalent to about 50 bricks. Because of their size and weight, they were placed by two men and required considerable care to lay properly and get good mortar joints at the ends. Common (hard-burned) red bricks were used in the exterior walls at the doorways, windows and corners of the building. These bricks were also used to construct interior pilasters to support the roof trusses in this portion of the building. The brick pilasters were bonded to and made integral with the tile walls by extending the brick masonry into alternate courses of the tile. The pilasters were capped with concrete. All the tile and brick were laid with Portland cement mortar.

Seven large window openings extending to the roof are located on each side of the westerly part of the building. The window sash are divided into small panes and both the sash and frames are of pine. The sills are precast concrete blocks set in the tile masonry. A standard wood door in the west end of the building provides access to the locker room. Two sliding steel doors 8 ft. 6 in. wide are located on each side of the shop in this section of the building, each with lintels consisting of reclaimed steel channels.

The interior partitions at the west end of the building were constructed of hollow building tile, 5 in. by 8 in. by 12 in. in size. Two doorways provide access to the wash room from the

locker room and one doorway from the locker room into the shop. All wood in the doors and windows was toxic-treated after framing.

The roof trusses, which are a simple triangular design, were placed on 20-ft. centers, and span the full width of the building. They are formed of scrap angles of various lengths. These angles were butt welded to form pieces of sufficient length to fabricate into the trusses, which fabrication was also done by welding. Two 4-in. by 3-in. by 5/16-in. angles were used in the top and bottom chords. The other members of the trusses were made up of angles 3 in. by 2½ in. and 2½ in. by 2 in., and ¼ in. thick. In designing the trusses, the welds and stress computations were based on current specifications of the American Welding Society. The roof deck is supported on 3-in. by 6-in. rafters spaced on 5-ft. centers, and purlins consisting of 10-in. channels, which are riveted to the upright members of the trusses. The deck, of second-hand 2-in. by 6-in. D. & M. lumber, is covered with two-ply cold process built-up roofing.

Second-Hand Building

The east end of the shop, which houses the steel fabrication work as well as a part of the reclamation activities, is primarily a second-hand corrugated iron structure, purchased from an abandoned mine near Peoria, Ill., and shipped to Silvis. The corrugated iron is Robertson-Protected Metal. The frame of this part of the building is of steel, with 10-in. steel columns, triangular steel roof trusses and steel purlins. The lower parts of the walls are of conduit tile and brick, with precast concrete sills. Above the tile, all around this portion of the building, except at the doorways, are large window areas. These areas have steel sash, divided into numerous small panes. Above the window areas, the siding is of corrugated iron, as is also the roof. The corrugated siding is bolted to angles welded to the columns and the roofing sheets are bolted to the purlins.

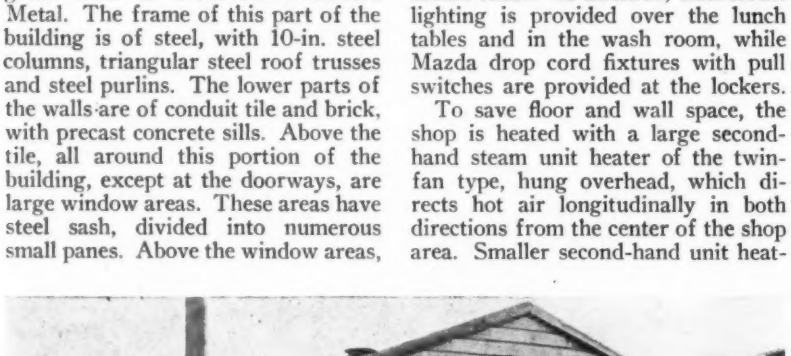
Because the roof at this end of the shop is higher than that at the west end, the interior clearance between the floor and roof trusses is 19 ft. 6 in., as compared to 12 ft. 2¾ in. in the remainder of the shop.

Five door openings, 8 ft. 6 in. wide, were provided along the north side of this part of the shop and one on the south side, all with double wood doors. A large double steel door 12 ft. high and 8 ft. 6 in. wide is located at the center on the east end. The steel doors, including the large door at the east end and the sliding steel doors in the other section of the shop, mentioned previously, have frames of second-hand angles welded together, and facings of old car roofing. The sliding doors were hung on reclaimed door fixtures.

Lighting and Heating

The lighting in general consists of drop cords with wall switches. All of the lighting material was either second-hand or reclaimed, except a small amount of new conduit. The shop has eight fluorescent drop lights in each bay (between roof trusses), which hang level with the lower chords of the roof trusses. These lights each have two 48-in., 40-watt, white fluorescent tubes. In addition, fluorescent lighting is provided over the lunch tables and in the wash room, while Mazda drop cord fixtures with pull switches are provided at the lockers.

To save floor and wall space, the shop is heated with a large second-hand steam unit heater of the twin-fan type, hung overhead, which directs hot air longitudinally in both directions from the center of the shop area. Smaller second-hand unit heaters are provided in the locker and wash rooms. Ventilation is also provided by the windows, the top halves of the wood window sash and four panes in the center of each panel of steel sash being pivoted at the center. In the roof, five second-hand 18-in. cast-iron Dickinson ventilators were installed on 60-ft. centers.



This End of the Shop Is Constructed Essentially of Electrical Conduit Tile

Other Features

A five-ton traveling overhead electric crane, located originally in another building at Silvis, was installed in the east end of the shop. The crane is supported on two horizontal channels attached to the vertical columns on each side of the building. The crane runway is 60 ft. long. A 1½-in. water line, a 1¼-in. air line and a 1-in. high-pressure steam line were supplied to the shop, in addition to a regular low-pressure steam line for heat, sewer lines, etc. Special foundations were built as required for some of the machinery, such as hammers, rod straighteners, etc., but in general the machinery was set directly on the slab floor. A wire netting enclosure was built to house the oxy-acetylene equipment.

In the lunch and locker room, two lunch tables and benches and 112 reclaimed steel lockers were installed. The wash room has 6 second-hand toilets, 12 second-hand lavatories, 2 shower baths and a large hot water heater and hot water tank. Two water coolers for drinking water are located in the shop. Second-hand fixtures were used throughout in the plumbing work.

The building has concrete driveways around three sides and a concrete walk on the west side. All concrete, including that in the floors, foundations and driveways, is of 3,000-lb. strength and was hand troweled to provide a durable wearing surface. Reinforcement was used alone in the foundations under the side walls, this consisting of two rows of ½-in. round rods.

Although the reclamation shop was built largely of second-hand and reclaimed materials, it presents an unusually attractive and trim appearance for this type of building. Furthermore, it provides better quarters for the reclamation work, with good lighting, heat and ventilation, and a more efficient arrangement of the reclamation equipment.

This work was done under the general supervision of W. H. Hillis, operating officer, and F. W. Thompson, chief engineer. The preparation of plans for the building and supervision over its construction were under the direction of D. A. Ruhl, engineer of buildings.

The Foreman Is Responsible For His Men and Must See That They Are In the Clear of All Passing Trains

Maintenance Accidents— How to Prevent Them*

By Frank O. Divisek

Assistant Chief Claim Agent,
Denver & Rio Grande Western,
Denver, Colo.

In this paper, the author shows that only the foreman is in position to do the most effective safety work among his men, and that he must teach them by example as well as precept if he expects them to have the proper regard for his instruction

IF A man is to be a truly safe employee, he must put safety into every thought and action. Yet, it is easy for a man to become so completely absorbed in his thoughts and work that he is unmindful of the safety of himself and others. For example, while attending a meeting some time ago, I saw an insurance adjuster light a cigar and then throw the lighted match out of the window, where it fell to the alley below. I have also seen men do the same thing with lighted cigar and cigarette butts.

It has been said a man needs not so much to be educated in safety as to be reminded of it. The Pullman Company has placed "Watch Your Step" signs on its car steps. Everyone knows that he should watch his step, but the sign is there to remind him right at that time to take that precaution. On certain machines in our shops, we have placed signs reading "Wear Your Goggles." The purpose of this is not so much to inform the man of this necessity as to remind him as he steps up to the machine that he should put on goggles. In other words, the work of a safety advocate is never done. He must not only teach men how to protect themselves, but also must remind them constantly to practice safety first.

*Abstract of a paper presented at the annual meeting of the Association of Railway Claim Agents, at Chicago, June 16.

Two Rules a Day

Before starting to work each morning, it is good practice for the foreman to read and explain to the members of the gang one or two rules from the safety-rule book. This serves, over a period of time, to call the attention of the men to all of the rules, and also makes them safety-minded each day as they start their work.

The application of the principle of safety first should receive the wholehearted support of every officer of the company, from the president down. It is only in this way that the movement will have the dignity and authority that it deserves and which is necessary to get the favorable response from the men to whom it actually applies. The entire line of supervisory officers must be standard bearers of the cause of safety. Practically all maintenance-of-way accidents are the result, directly or indirectly, of lax supervision. The remedy, therefore, is practical instruction and close conscientious interest to see that the job is done well and in a safe manner. This is not an indictment of the foreman as such, for his responsibilities and problems are many. But he is naturally the supervisor who has the close personal contact with the men, which is necessary to enable him to teach them safe methods of conduct and the correct manner of performing the work.

Some foremen seem to think that they have discharged their whole duty in the promotion of safety by telling their men at the beginning of the day's work, "Now, boys, be careful and don't get hurt," and then they proceed to forget about it for the remainder of the day. Such an admonition is not enough, and a foreman who does this is not fulfilling his obligation to his company, to his men, or to himself. He must show his men how to be careful and how to do the work without injury to themselves and others. This can be done only by close personal supervision throughout the day, teaching them to be alert, planning their work so as to do it safely, correcting improper methods, actually showing them how to do the work and explaining why that is the safe way.

A safe employee is an efficient employee and the time consumed in giving a man such instruction will be repaid quickly in productive service. To do this successfully, however, the foreman must arouse the interest and

excite the co-operation of his men so that they are receptive, and they will be receptive if he has sold them on the idea that safety first means just what it says, and that it is being urged for their protection and well being.

His Brother's Keeper

The foreman must be willing to accept the stewardship of being his brother's keeper. His superiors must make it plain to him that the requirement of safety is as important as the requirement of production, and they must also give him sympathetic co-operation and work hand in hand with him in meeting his responsibilities. The foreman also must advance the principle of safety first by example, that is, by practicing safety. If an employee sees the foreman do a job of eye-dangerous work without the protection of goggles, no amount of talk about the necessity of using goggles in certain kinds of work will have any effect upon him.

Let us consider accidents in which maintenance of way employees are injured, that arise entirely from the work that the men are doing at the time. These involve the use of tools, methods of doing the work, and work necessitating the co-operative effort of several men. The men should be instructed in the correct use of the tools, which involves picking the right tool for the job and then using it correctly. The work should be planned with the view of avoiding accidents. Where the co-operative effort of several men is necessary, there should be careful assignment and spacing of the men and a well-established set of signals should be decided upon so that there will be no confusion in performing the task.

One of the most important considerations in this class of accidents is the discovery of defective tools and equipment. All tools should be inspected daily by the foreman or by a competent workman designated by him. All defective and worn-out tools should be segregated from those that are in good condition. Each man should be instructed as to what constitutes a defective tool and he should, himself, inspect each tool before performing any work with it. All equipment should be tested and known to be safe before being used. The premises should be maintained in such condition as not to cause an accident.

We have many accidents where men are injured by passing trains. All men should be instructed that they must at all times keep a lookout for approaching trains, and not rely on others to inform them of their approach. When a train is passing, they should step clear of all tracks to avoid being struck by objects falling from the train, and also to avoid being struck by cars or trains moving on other tracks. Goggles should be furnished and should always be used when doing eye-dangerous work, and the men should know what work is considered eye-dangerous.

Introduction of the use of rail-laying machines, tamping machines, adzing machines, etc., has brought about a definite decrease in the number of maintenance of way accidents. The principal arguments for mechanizing maintenance of way work have been economy and efficiency, yet the safety value has been still greater.

The Motor Car

The most important maintenance accidents occurring under circumstances not connected directly with the job are motor-car accidents. Some years ago, I worked on a railroad where there was a section foreman who did not believe in wasting words. One day he sent his roadmaster this message, "No. 6 did not whistle. Please send new motor car." That was all, but we knew what had happened. Although it may be as simple as that to report a motor car accident, it is much more involved to tell how to prevent one.

The advent of the motor car has been a blessing to the maintenance of way forces. It is no longer necessary to push a heavily-laden push car for miles, or to pump an old hand car to get home from a hard day's work. While its universal use bespeaks its value, it has introduced new elements of danger and added responsibility for the foreman and members of his gang. With the exercise of care, the motor car is effective and useful, but when operated carelessly, it becomes one of the most dangerous instrumentalities on the railroad. I am told that in the last 20 years, 1,000 maintenance of way men have been killed and 40,000 have been injured more or less seriously in motor car accidents, so it is apparent how important it is to safeguard against this type of accident. I believe every railroad has a prescribed set of rules governing the operation of motor cars and these should be complied with strictly and their violations met by discipline.

Speed should always be restricted to conform with safety. The motor car should always be definitely under the control of the operator, so that it can be stopped within the distance the track is seen to be clear. Speed should be reduced when going over switches and frogs, within station limits, where the view is restricted, in approaching and going over highway crossings and, in fact, every place where there might be danger of derailment or collision. Under no consideration should the motor car ever be operated at a speed higher than that designated for that type of motor car. The weather conditions and the condition of the rail must be taken into consideration. Speed restriction is most important, for excessive speed is the cause of most of our motor car accidents. The motor car should be inspected daily with respect to its mechanical condition. The brakes should be inspected and tested and inspection made of the deck, hand railings and hand-holds, alignment and gage of wheels, etc. No one should be permitted to operate a motor car until he has passed an examination on the rules, for sight, and for hearing, and has been found to be thoroughly qualified to do so.

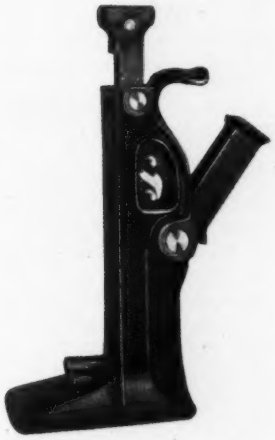
The motor car should always be operated with due regard for the safety of persons riding on it, as well as for that of persons on or near the tracks. The car should not be operated with sudden jerks in starting or stopping, which might cause serious injury to persons riding on it. Tools and materials must be loaded carefully, so they will not become dislodged by the movement of the car. The ends of the tool trays should be high enough to prevent tools from sliding off. Every precaution must be taken to avoid collision with trains and with other track cars. The operator should have a standard watch and the current time-table, and should obtain a late lineup of trains before occupying the main line. The operator should always be on the lookout for other cars and, where the view is restricted, the car must be protected by flag.

Should Assign Seats

Each man on the gang should be assigned a permanent seat on the motor car, which he should always occupy when riding. Each man should also be assigned a specific task to perform in removing or handling the car in case of emergency. The men on the forward end should keep a lookout to see that the track is clear ahead, and the men on the back end should do the same to the rear. Others should see that tools and material do not become dislodged and fall off the car. One man on the front end of the car should have a red flag and torpedoes in hand and be prepared to flag ahead immediately, if necessary, and, likewise, one man on the back end should be prepared to flag to the rear. All men should be on the alert and watchful constantly, and no scuffling or horseplay should be permitted. Track cars must be brought to a stop when meet-

(Continued on page 666)

What Causes Jacks to Fail?



By F. J. Jakoubek

Chief Engineer, Templeton, Kenly & Co., Chicago

WHAT causes jack failures? In general, they can be traced to lack of care, and abuse. Modern jacks are designed for the work for which they are intended and are sturdy in construction, but, like other tools, they cannot withstand neglect and abuse indefinitely. It is probable that few tools receive so much rough handling and frictional wear as jacks, implying the need for more careful attention to lubrication. In many cases, jacks returned to the manufacturer for repairs after years of use, show every indication of never having been lubricated.

A good grade of grease or oil should be applied to all bearing surfaces as needed. It should always be borne in mind that correct lubrication not only saves wear by reducing frictional losses, but by the same process it minimizes the effort required to operate the jacks under load.

Do Not Overload

Neglect of lubrication, severely as it affects both the service life and the ease of operation of the jack, is by no means the most serious form of abuse to which jacks are subjected. For even worse is the common fault of overloading. Jacks are, or should be, tested for a 50 per cent overload by the manufacturer, but that does not mean that a 50-ton jack should be used to lift 75 tons. The margin between the rated capacity and the test load is merely the safety factor for the protection of those who operate the jack. The weight of the load which is to be lifted should be estimated conservatively, and a sufficient number of jacks should be employed to keep within the rated capacity of each of the jacks in the group.

Overloading imposes stresses that can spring racks and other parts, and will result in eventual if not immediate failure. Such failures can be hazardous. It does not matter whether the jack is of the track or automatic-lowering (lever) type, of the screw type or of the hydraulic type for, regardless of the type, the same precautions against overloading should be taken at all times.

Keep Dirt Out

Another bad practice that generally springs from neglect or inattention, is that the operating mechanism or rack bar of lever jacks is allowed to become fouled with dirt. Obviously, this is sometimes unavoidable, since manufacturers stress proper lubrication of jack parts, which are bound to pick up some dirt, particularly track jacks whose mechanism is exposed. However, when dirt does get in, it should be blown out. If necessary to obtain a good job, the jack should be washed in kerosene. There is less opportunity for this with jacks of the non-tripping or automatic-lowering type, which must be jacked down, as the operating mechanism is protected by a cover plate. In either case, however, one should keep the socket pawl cavity seat and the rack teeth clean.

Screw jacks are made in various forms, including the regular bell-bottom type, the standard speed or journal jack type, the push-pull design, the shoring jack, the trench brace jack and other types such as the machinists jacks. It is important that the screws of all of these types be kept clean and well lubricated. Continued exposure to grit and dirt will cause abrasion of the screw, wearing the threads so that play will develop between them and the collar threads, and scoring of the sleeves which sometimes causes failure of the jack during lowering operations.

Center Under the Load

Another form of abuse that stems from mishandling, often occurs in placing the jack under the load. Irrespective of type, in rating the capacity of a jack, the primary assumption is that the load will be placed squarely on the cap and that the direction of the force represented by the load coincides with the axis of the jack. If the load is not centered on the cap or toe lifts, undue stresses will be imposed on the rack bar, the screw or the ram, causing, at the best, premature wear, and at the worst, severe damage to the jack. In addition, there is a serious hazard involved in this form of incorrect loading. A weak foundation might be able to sustain the load with the jack squarely under it, while eccentric loading of the jack may cause it to kick out.

Another precaution that should never be overlooked is that of having sound, well-seasoned timber blocking under the jack wherever this is possible; this is particularly important when working out of doors. Correct blocking increases the area upon which the load is supported, and thus protects floors from too high a concentration of load. Particular attention should be given to blocking or shimming in those cases where the load does not act at right angles to the floor or ground. In such cases, the jack should be properly blocked and shimmed with wedges so that the cap will be in full contact with the load.

Safety

Do not set your jack for trip or in lowering position until actually ready to trip or lower. Be sure lever bar is

removed from socket when jack is not in operation. Failure to observe these precautions is hazardous and may be the cause of serious injury.

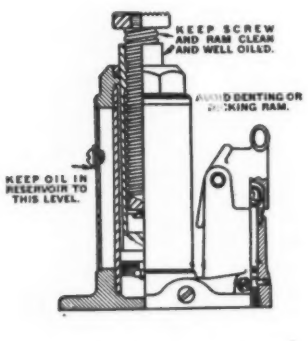
Automatic Lowering, Track and Trip Jacks

Check overplay. When the pawl clicks into position, the socket stop should be not less than ½ inch from the housing, on both the up and down strokes. If it is less than ½ inch, the clearance should be checked.

Keep the spring link on automatic lowering jacks clean. Dirt or caked grease will interfere with the correct spring tension. Wash with kerosene occasionally.

On single-acting track or trip jacks, if the socket stop is less than ½ inch from the housing, the pawl clearance should be checked by inserting a 3/32 inch feeler in the space between rack tooth and the pawl tooth with the socket in the "click" position. If the feeler will not enter, the jack is not safe for use.

Check the spring "click" frequently on track or trip type jacks. It is important that this be done, because



it is a signal that the pawl teeth are meshing correctly with the rack teeth.

Use correct size of pole or lever bar. The wrong size not only endangers the operator by reason of the probability of slippage, but it also places needless strain on the lever sockets, poles or lining bars.

Never use a jack as a maul or for stopping cars. Do not throw it onto ties or against rails. While jacks seldom break from rough treatment, they do get out of alignment when handled roughly or abused in other ways, and endanger operators.

Screw Jacks

Machine oil should be used in preference to grease for lubricating the screw. Every care should be taken to insure that the bearing under the cap is lubricated regularly, using grease in this instance.

Do not extend the screw beyond the safe limit. Roughly, not more than two-thirds of the screw should be run out. Some jacks are provided with a safety peep hole in the base, beyond which the screw should not be extended.

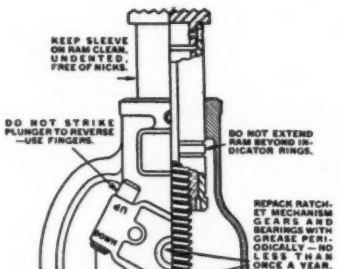
Clean the screw and housing or base occasionally to remove grit and other dirt, and then relubricate.

Journal Jacks

Do not operate or extend the ram beyond the indicator rings. A safety stop is usually provided.

Operate the reversing plunger on the ratchet mechanism with the fingers. Do not strike it with a hammer or other tool.

Keep the sleeve on the ram clean and free from nicks. When the jack


KEEP SLEEVE ON RAM CLEAN, UNDENTED, FREE OF NICKS.
DO NOT STRIKE PLUNGER TO REVERSE —USE FINGERS.
DO NOT EXTEND RAM BEYOND INDICATOR RINGS.
REPACK RATCHET MECHANISM GEARS AND BEARINGS WITH GREASE PERIODICALLY—NO LESS THAN ONCE A YEAR.

Accompanying Sketches Suggest Some of the Precautions Essential in the Proper Use and Maintenance of Track and Bridge Jacks

is used periodically, wash it with kerosene once a year, blow out any grit that may be present, and repack the ratchet mechanism and gears with grease. The base can be removed readily. When the jack is used regularly, it is necessary to wash and repack it three times a year.

Hydraulic Jacks

Keep the oil in the reservoirs at the correct level. Refill them with the grade of oil intended for the purpose. Do not expect the maximum lift if the reservoir lacks oil.

Keep the ram or sleeve as clean as possible and free from nicks and dents. A clean ram will not carry dirt down into the cylinder.

Do not use a lever bar longer than the one supplied with the jack. A lever longer than this makes it possible to lift a heavier load than the jack was intended for, with probable damage to the jack and with excellent chances for an accident.

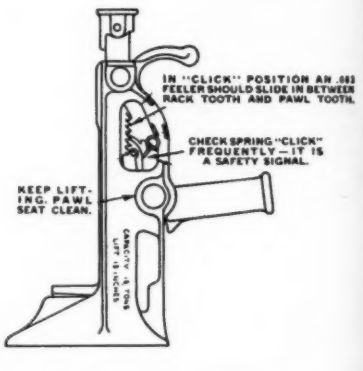
Make certain that the nuts at the top and the base of the housing are tight enough to prevent leakage.

If the jack is of a design in which the release valve is not shielded, make certain that it is not struck or damaged otherwise.

Do not throw a jack of this type down or strike it with a hammer while it is under load. Particularly, never permit anything to strike the pump, as this is likely to damage it beyond repair.

Precautions Worth Effort

If the foregoing rules are followed conscientiously, the service life of jack will be increased greatly, and maintenance will be reduced. It takes time to do the things that are mentioned, but, generally, this is less than the time required to make repairs, and prevention is less expensive than cure. We owe it to ourselves at all times to make, not only jacks, but all tools and equipment, last as long as possible, but particularly at this time it is still more necessary in the interest of national economy. The metal that has been wasted in the past,


IN "CLICK" POSITION AN .093 FEELER SHOULD SLIDE IN BETWEEN RACK TOOTH AND PAWL TOOTH.
CHECK SPRING "CLICK" FREQUENTLY—IT IS A SAFETY SIGNAL.
KEEP LIFTING PAWL SEAT CLEAN.

through abuse and poor maintenance of jacks, is needed now as never before.

The manufacturer of your jack will always be glad to answer any questions with respect to particular maintenance problems or unusual applications. He is genuinely interested in having you get maximum service and the longest possible service life from your jacks. All that he asks is that you do not expect the impossible from a jack, such as trying to lift a 20-ton load with a 5-ton jack. To do this or many similar things that are attempted with jacks, is unfair—to yourself because of the waste of material involved and of the hazard that is created; to the manufacturer, whose reputation for fair dealing and honest workmanship is thus impugned; and even, it may be said, to the jack itself, which is given no opportunity to demonstrate its sturdy construction and job worthiness.

Care Will Make Belting Last Longer in Any Service*

By C. R. Knowles
Superintendent Water Service (Retired)
Illinois Central, Chicago

BELTING is used by the railways for a wide variety of purposes, including motor cars and other work equipment, for pumping, in the operation of machinery, in elevating equipment, for conveying materials and for many other forms of power transmission. However, in all of these applications, there are only three types of belts in general use—the flat belt, the V-belt and the round belt. The great majority of belts used in railway service are of the flat type. Most of these are cut to the desired length and the ends are spliced on the job, although many, generally called endless belts, are made in the desired lengths by the manufacturer and do not require splicing. Endless belts are used extensively on track motor cars; flat belts are constructed of leather, rubber or canvas; the V-belt is endless, although a spliced V-belt has appeared on the market recently, and is constructed of a composition consisting largely of rubber and cotton fibre to give it strength and prevent undue stretching. These belts are adapted particularly to short belt centers. Round belts are generally made of leather and are used to a limited extent only, in the smaller sizes. Another type of round belt is used in the form of the rope drive, which is employed only for the transmission of power in large plants, such as grain elevators, although in modern installations, rope transmission has been supplemented largely by individual motor drives. This discussion will apply chiefly to the flat type of belt and the rubber V-belt, as they are used more extensively than other belts.

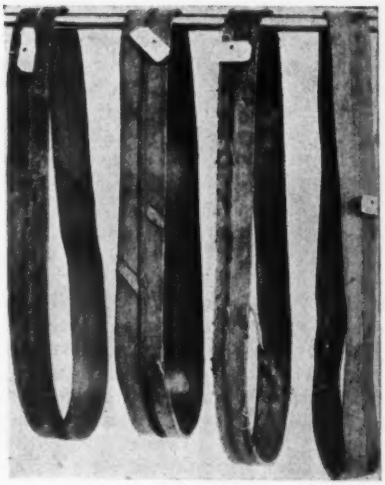
The weakest point in any belt is the splice. When laced, the belt is no stronger than the lacing. When the splice is glued and sewed or riveted, the strength is more nearly equal to the strength of the solid belt. If the splice is made in the factory to produce an endless belt, it will have the full strength of the solid belt. Extreme care must be exercised when making the splice, when the two ends of the belt are joined in the field or shop. There are many devices for joining the ends of belts, from the lace leather, the wire service and the endless belt to an almost endless variety of metal fastenings. Much damage and other belt trouble can be avoided, and the life of belts can be prolonged by using care and skill when cutting and lacing belts. For instance, a square should always be used when cutting a belt to make a splice, to insure that the ends will be square and even.

If patent fasteners are used, they should be of the correct dimensions for the thickness and width of the belt, as well as for the pulley diameters. They should be applied strictly in accordance with the instructions of the maker, and in a manner that will avoid tearing out the holes in the end of the belt, or otherwise damaging it where wire or rawhide lacing is used. The holes should be as small as is consistent with the size of the lacing, and they should be made with a belt punch or other tool that will leave a clean hole. Lacing should always be paralleled with the belt on the pulley side, and all laces should be crossed on the opposite or outside of the belt.

Running the hair side of leather belting on the pulley will add to the life of leather belts, since the strongest part of the leather is on the flesh side, about one-third of the way through the leather. In this way, the strongest part of the belt will be subjected to the least wear. Furthermore, the hair side adheres better to the pulley as it is smoother, and this will tend to reduce slippage and consequent wear on the belt. When run with the hair side to the pulley, leather belts will drive as much as 30 per cent more than if run with the flesh side to the pulley.

Loose belts will last longer than tight belts, for which reason the tension on the belt should be only enough to transmit the desired power without slippage. Tight belts also increase friction and wear on shaft bearings.

*This discussion was submitted in answer to a question in What's the Answer department with respect to the methods that can be followed to prolong the life of belting. However, because of its comprehensive character, it has been withheld for publication here as an independent article. For further discussion of this subject see page 457 of the June issue.



Care should always be exercised to avoid running belts too tight or too loose, as either will result in loss of power and damage to the belt. A correctly-adjusted belt seldom requires a dressing to make it pull properly, but if a dressing is used it should be used sparingly. It is important that both belt and pulley be kept as clean as possible.

The direction of belt travel should be with and not against the lap of leather belts, to avoid the possibility that it may become loose at the edges. The pulley should be a little wider than the belt to prevent it from overhanging the pulley. Vertical drives should be avoided whenever possible because, when running in a vertical line or at a slight angle from the vertical, the belt must be kept under tension to avoid excessive slippage. The best results will be obtained at an angle of 45 deg. or less with the floor.

Rubber V-Belts

Single and multiple V-belt drives are used extensively by various industries and are coming into greater use on the railways. One manufacturer estimates that 70 per cent of the machine tools engaged in making parts for American planes, guns and tanks, are driven by V-belts. V-belts are composed of rubber fabric and cord, and are readily adapted to use in most belt drives on the railways, particularly where short belt centers are desired. Unlike the flat belt, short centers are not only desirable but necessary to the effective operation of a V-belt. Pulley centers should not exceed three times the sum of the diameters of both sheaves, and should not be less than the diameter of the larger sheave. V-belts are subject to stretching in use and, if possible, provision should be made for adjustment of the centers, since sagging results in

a loose belt which may whip when the power is applied, or under peak loads. This whipping will increase the belt stretch and may cause it to break. V-belts should always be tight; they should even be under a slight tension for best results. When tension adjustment is not provided, it is sometimes advisable to employ an idler to keep the belt tight.

When replacing old belts on multiple-belt drives, the entire set should be renewed, to insure the same tension in all units of the set. New belts applied to old sets do not have the same tension as the old belts, while they grip the sheave better than the old belts do. Because of less wear and greater area of contact with the sheave, the new unit will wear faster and is more subject to premature breakage than the older units in the set. Under no circumstances should the belt be allowed to slip, as slipping will overheat it and wear it out quickly. Dust, dirt and oil also cause belts to slip and wear. Oil should never be allowed to come in contact with rubber V-belts, for it will not only cause slippage but will destroy the rubber. V-belts should not be pried or forced over the edges of the sheaves; more of them are distorted, broken and damaged otherwise by this practice than in actual service.

A leather V-belt has been developed recently, that can be cut and spliced to the desired length on the job. The side walls are leather, and are assembled on a leather core and cemented in place. The belt is supplied in rolls, and is made in three standard section sizes. The tools required for splicing, together with the cement, may be secured from the manufacturers of the belt.

To obtain the maximum life and service from any belt, it is essential that the pulleys or sheaves be in correct alignment and that the belt selected is the best suited for the service required of it. The most expensive belt is not always the one that will give the best service. For example, a leather belt will not give as good service as a rubber or canvas belt at a much lower cost, when exposed to dampness. Care in storage and in service will make belting last longer in any service.

Belts should be kept in a clean dry place, away from heat when not in use, and should be used only for the purpose for which they are intended, namely, the transmission of power. It is a fact, however, that they are sometimes abused when not in use and are often used for purposes other than that for which they are designed, such as making gaskets and washers, hinges for doors, and even for half soling shoes—uses for which much cheaper and less vital materials will answer. Everything that enters into the construction of belts is restricted in use and classed among the most vital materials. Therefore, their conservation is absolutely necessary.

How Pennsylvania Maintains Work Equipment

(Continued from page 655)

and dismantled in the gasoline engine repair shop. Guard rails are also stripped from the car if they require repair and are taken to the pipe and sheet metal shop, the frames are repaired in the adjacent cabinet shop, and wheels, axles and brakes are checked and changed or repaired, if necessary. When the car is reassembled, it is tested on the motor car test rack to see if the motor delivers the rated horsepower. It is then repainted and shipped out.

The engine repair section of the shop is equipped to rebore cylinders and grind valves and valve seats; it also has a main bearing line boring machine for crank-shaft work. The shop has recently installed a spray metal machine which deposits a spray of molten metal on the part being repaired, and tests are being made on crank shafts repaired with the spray metal deposit.

The Pennsylvania is constantly seeking to improve its work equipment or develop new equipment for specific tasks, and in pursuit of this objective, has been responsible for developing and improving many types of such equipment. An example is the repair, several years ago, of some old pneumatic tampers, which were overhauled with a closer fit and were also modified by closing one exhaust chamber, with the result that the tool which formerly used 21 cu. ft. of air a minute now uses only 12 cu. ft. Tests showed that the change did not reduce the power of the tamping blow delivered below that of present low air consumption tampers and the improvement allowed 16 tools to be operated from a 210-cu. ft. compressor instead of 12. Another example is the construction at the shops of specially-designed ballast shaping and ballast leveling devices which can be attached to ballast scarifier and discer cars or to any heavy-duty four-wheel-drive motor car allowing this equipment to be used the remainder of the season after the scarifying and discing work has been completed. Other more recent examples are a tie plate gaging device, a joint bar clamp, a creosote heater and a device for breaking rails, all of which are used in rail laying work.

Records are kept of all work equipment failures or defects, and when one part of a machine shows more than a reasonable number of failures, the redesign of that part is considered at the shop, and the manufacturer is also advised. A card record is also maintained of all the new parts applied to each machine and this provides a basis upon which the need for replacement parts may be anticipated. It also provides a comparative service record for many types of repair parts.

In the past, before equipment was overhauled, the cost of repairs was checked in comparison with the cost of a new unit, and if the ratio was too high, the machine was scrapped. As a result of the War, this practice has been modified temporarily and practically all equipment is being carried over during the present emergency, unless it is so badly worn that it needs almost complete rebuilding.

How Prevent Accidents

(Continued from page 662)

ing, or when being overtaken by, a train on an adjacent track, and the occupants must alight and stand a sufficient distance away to insure their safety.

About 20 per cent of all employee casualties occur to maintenance-of-way men. Although the casualty frequency rate in the transportation department is much higher as to fatalities and severe injuries than in the maintenance-of-way department, the number of minor injuries is relatively larger in the latter group. In the transportation department, the men are in contact with cars and locomotives, and often work at night and under other unfavorable conditions. In shops, the work is connected with complicated machinery and with the handling of heavy materials and equipment. However, in the maintenance-of-way department, the physical hazards can be controlled more easily because the tools are simple and the gang is under the direct supervision of the foreman who is continually in close contact with the work, as well as with the men. Therefore, the field of maintenance-of-way work is one in which the principles of safety can be applied most effectively. As about 90 per cent of all accidents are regarded as avoidable, this constitutes a challenge to all who are interested in safety, and indicates that there is still much work to do, not only to maintain the present standard, but also further to eliminate avoidable accidents.

What's the ANSWER?

How Many Tightenings?

Where a bolt tightener is used when laying rail, should the bolts be retightened? After what interval? How many times? Why? What tensions should be employed?

Quotes A. R. E. A. Committee

By I. H. SCHRAM
Engineer M. of W., Eastern Dist. Erie, Jersey City, N. J.

The answer to this question is still yes, just as it has been through all methods of bolt tightening, and this conclusion is reached after study of the considerable research which has been carried out on this subject in recent years. A discussion of one of the latest of these appears in the 1943 Proceedings of the American Railway Engineering Association, where a clear report is given by one of the subcommittees of the Track committee on its assignment-Bolt tension necessary for proper support of rail joints. This subcommittee made extensive tests on several railways, and gave its conclusions, which apply to laying rail as well as to any other application of rail joints, and includes consideration to the use of bolt tighteners.

After listing our purposes for providing tension in track bolts, which will not be quoted, three practices were recommended for accomplishing these purposes. The second practice recommended, the one pertinent to this discussion, was that "track bolts should be tightened not sooner than one month or later than three months after the joint bars are applied, and at intervals of one year thereafter. More frequent tightening is unnecessary and, therefore, uneconomical. Less frequent tightening requires too high an applied bolt tension to carry over the longer period." It is believed that this conclusion incorporates the best practice and is flexible enough to include various methods of resurfacing or reballasting track after the rail is laid, which work should be done before the bolts are tightened the second time.

The first practice recommended in this report stipulates that the bolt tension, when applied, should be within the range of 15,000 to 25,000 lb. which, it is stated, meets all requirements adequately. It is recommended that those who have not read this report give it careful study, as it covers the subject most completely.

Should Be Done Soon

By T. M. PITTMAN
Division Engineer, Illinois Central, Waterloo, Iowa

When new rail is being laid, there are usually a number of joints in which the bolts are not tightened sufficiently or where the joint bars are not fitted properly. It is a good idea, therefore, to go back over the track to tighten the loose bolts and adjust the joint bars. Improperly fitted bars are quite likely to work loose under traffic, for which reason the retightening should be done as soon as possible after the rail has been laid, to avoid permitting trains to run over loose joints. New rail is usually surfaced as soon as possible after it has been laid, so that the joints can be checked when the surfacing is done. The amount of work required to do this will depend on the care with which the rail was laid. If power wrenches were used in the rail operation, the joints that were applied properly will

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered in November

1. To what extent can maintenance be programmed under present conditions affecting labor and materials? What advantages? Disadvantages? Why?

2. Considering the desirability of conserving ice, what measures in the way of ventilation or insulation of existing ice houses can be taken before the winter crop of ice is stored?

3. In view of the shortage of experienced operators, what special methods should now be employed to recruit and train new men to operate power machines? What details are most important? Who should be responsible?

4. Do present conditions make it specially desirable now to preframe and treat timber for spot renewals of bridge members? For sectional renewals? For buildings? What considerations are involved?

5. In view of the present shortage of ties, what changes, if any, should now be made in tie-inspection practices? Should an independent tie inspector accompany the foreman to insure against premature removal? Why?

6. What precautions should be exercised to prevent damage when operating globe and gate valves?

7. In expectation that traffic will continue at its present level, what work should yard gangs now undertake in preparation for winter?

8. What effects do the present restrictions on the use of linseed oil have on the application of putty? What substitutes are available—the relative advantages and disadvantages?

not ordinarily require any other attention than the tightening done in connection with routine track maintenance.

Track men have never been able to agree as to the tension to be given the bolts, but the general tendency is to wrench the bolts until they are too tight, which damages the threads and nut locks and causes some of the bolts to break in cold weather. A practical method for determining the correct tension is to tighten a bolt by hand with a standard track wrench, and then set the bolt tighteners so that they will kick off this bolt without tightening it any more. To keep the wrenching uniform, it will be necessary to check the machines and reset them at frequent intervals.

Must Not Be Too Tight

By W. H. Sparks
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

It is the general practice today to employ bolt tighteners when laying rail. While it is not debatable that the bolts should be well tightened, or even somewhat over-tightened at this time, care should be exercised to insure that they are not drawn tight enough to damage the threads, a contingency that is particularly apt to happen when inexperienced men are assigned to the machines. It is true that most of the bolt tighteners in use today are set to kick off when the desired tension in the bolts has been attained, but the point of kickoff is not well defined, and the machines need frequent adjustment to insure that they will come even close to the desired tension.

No matter how carefully new joint bars are applied to new rail, and regardless of whether the fishing surfaces have been oiled, considerable adjustment with respect to the fit of the bars takes place during the passage of the first few trains. Again, as the mill scale on the fishing surfaces loosens, still further adjustment occurs. Furthermore, under the pressure to "keep up with the procession" which characterizes all rail-laying operations, some of the joint bars will be fitted poorly. The net result of all of these factors is that within a short time the initial tension in the bolts will have been relaxed and some of the joints will actually be loose. For these reasons, within a few days, experienced men should go over the rail with track wrenches to tighten the bolts that are obviously loose, and to tap the lower edge of all bars with a light hammer, exercising care not to strike the rail. It is surprising how much slack can be taken up in this way. Later, the bolts should be tightened again, using bolt tighteners this time.

What should the bolt tension be? This has been the subject of much debate, which, so far as I know, has not been settled. Certainly, the tension should be sufficient to support the joint and enable it to function as intended. On the other hand, the tension should not be so great as to freeze the joint or strip the threads, both of which can happen through over-tightening.

Substitutes for Oakum and Jute

Since oakum and jute are becoming scarce, what satisfactory substitute can be employed for making lead joints in bell and spigot pipe? How can lead be conserved?

Like Hydraulic Packing

By E. L. Cales
Supervisor Water Supply, Chesapeake & Ohio, Hinton, W. Va.

Dry braided fibrex makes a satisfactory substitute for oakum and jute, which are now becoming scarce, for making lead joints in bell and spigot pipe. It has the advantages that the heat of the molten lead does not burn it, and that the water does not soften it. It is made on the same plan as hydraulic packing and is helpful in lining up the joints to be leaded.

Many Have Been Offered

By C. R. Knowles
Superintendent Water Service (Retired), Illinois Central, Chicago

Even before the present critical situation developed with respect to the supply of oakum and jute that is available, many substitutes for these materials had been offered for use in making lead joints in bell and spigot pipe. In general, the term oakum and jute is used collectively, although they represent two distinct kinds of fibre obtained from widely separated sources. The term oakum was applied originally to the coarse fibres separated from flax or hemp during the process of hackling, and considerable oakum is still produced in this way. However, most of the oakum in common use today is obtained by separating the fibres of discarded hemp rope.

Jute takes its name from a plant similar in some respects to hemp, which has been grown in India from remote times. In fact, the name is a corruption of a Sanskrit word meaning matted hair. Jute substitutes are made from several species of the mallow family of plants, including the common garden okra. Jute is one of the easiest and most cheaply spun fibres, but one of the least durable. It is in itself a substitute for oakum or hemp as a jointing material.

Substitutes, as used in the past, have included cotton rope, sisal, false hemp, rubber and various rubber compositions, all of which are now either scarce or are classified as prohibited materials. Rubber rings for bell and spigot joints, as used in Germany, France and England and to some extent in this country, are now out of the question because of the shortage of rubber, except for a few special types of pipe.

One substitute now on the market and readily obtainable is made of paper. It has a molded core with a basket-weave covering, and is designed to be packed into the joint in the same way as braided jute is. It is treated with a water repellant designed to keep it sterile and to prevent it from disintegrating. It is made in ⅜, ½ and ⅝-in. sizes and comes in coils the same as braided jute. This material seems to offer the most satisfactory substitute for oakum, jute and the other materials that have been mentioned, at least until oakum and jute again become available. In some instances it may prove even more desirable because of its light weight and resistance to growth of bacteria.

Various substitutes for lead have also been used for making joints in bell and spigot pipe, chief of which are portland cement and certain sulphur compounds marketed under a variety of trade names. These materials are composed of a mixture of sulphur, iron, slag and other substances, in both solid and powdered forms. They can be melted and poured without difficulty, in the same manner as lead, and require no calking. They permit a little seepage when water under pressure is placed in the pipe, but the joints soon seal themselves and become water-tight. They have been in use for a number of years and are accepted as well

adapted for jointing cast-iron pipe.

Cement is used extensively as a jointing material, particularly for gas mains, although it is not used widely for water lines. The Cast Iron Pipe Research Association recommends that the joint first be packed with oakum or jute which has been dipped in a thin mixture of neat cement and water, and is then driven to place with a yarning tool. The cement for the joint should be mixed three parts of neat cement with one part of water. This mixture should be kneaded thoroughly by hand, using rubber gloves. The consistency when thoroughly mixed and kneaded should be such that no moisture can be squeezed out of the mixture. The cement should then be rammed into place with a wooden or metal tool similar to a yarning tool, but with a face wider and thicker than that of the yarning tool. The joint should then be finished with a fillet of cement at the face of the bell.

Only enough cement for one joint should be mixed at a time, and it should not be allowed to stand more than three minutes before it is used. After completion, the joint should be protected from loss of moisture for 48 hours, or until it has hardened thoroughly, also to prevent its freezing.

As a matter of conservation, as well as of good workmanship, lead should never be over-heated or burned in melting, as this will cause considerable loss. Lead melts slightly above 600 deg., F., and it is unnecessary to exceed this temperature to prevent cooling while handling, especially in hot weather. The correct pouring temperature for the lead can be determined by inserting a dry soft pine, or other softwood, stick in the melted lead, allowing it to remain for three or four seconds. If the stick has a light brown color when withdrawn, the lead is hot enough to pour; if it has begun to char or catches fire, the lead is too hot and the fire under the melting pot should be reduced, or more lead should be added. Too high a temperature can also be detected by observing the color of the surface of the lead for overheating produces an iridescent film.

It is not always possible to avoid spilling some lead when pouring a joint, but all such lead and the gate, as it is cut away, should be saved and remelted. Again, all lead that can be recovered from the joints when taking up or repairing a pipe line should be salvaged.

Extending the Life of Rail

Where rail is to be renewed, what incidental work other than surfacing and tie renewals will aid in extending its service life? When should this work be done?

Watch Every Item

By S. E. Armstrong
Engineer Maintenance of Way-System, New York Central, New York

Prior to laying the rail, it is desirable to have the track alinement staked out to determine whether any unusual lining is necessary. The profile of the track should also be run to ascertain whether there are any sags that should be eliminated, and which will necessitate raises in excess of the average surfacing raise that is intended. Any such heavy lining or surfacing should be done before the new rail is installed. Again, if the general surface of the track under the old rail requires it, correction should be made before the new rail is laid, to avoid possible surface kinks.

The entire operation of laying the rail should be carried out carefully if maximum service life is to be obtained from the rail. This includes all of the well known items of adzing the ties, correct setting of the tie plates, good gaging, correct expansion gaps, immediate application of anti-creepers, lubrication of the fishing surfaces, correct assembly of the joints and uniform bolt tension. As laid, the new rail must have good line and surface. Where loose ties occur, they should be tamped to a solid bearing for the rail. This is particularly important at the points where the old joints were. All of this is necessary to maintain good surface conditions, pending the spacing of the ties and the general surfacing of the track.

Following the laying of the rail, there are several additional features which will aid in extending the service life of the rail. Immediately after the rail is laid, all joints should be gone over to make sure that there are no cocked joint bars or loose track bolts which might have been overlooked.

Shortly after the rail is laid, the time depending on traffic, the rail ends should be cross-slotted to remove any overflow that has been produced by the cold-rolling action of the wheels, and thereby prevent chipping of the top surface of the rail head at the ends of the rail.

It is our practice to space the ties uniformly throughout each rail length, with each joint having a three-tie support. The tamping of the ties during the spacing operation must be uniform and thorough, both inside and outside the rail. This is equally true of the final surfacing operation, which today is invariably done with tamping machines.

It is also highly desirable to clean the ballast in the inter-track space and on the shoulder of the track. This can be done just prior to laying the rail or immediately thereafter, but it should be completed before any tie renewals, tie spacing and surfacing work are undertaken. Furthermore, such drainage features as need correction should be provided for, and these can be cared for shortly before or shortly after the rail is laid.

Further prolongation of the service life of the rail can be obtained in later years by such additional features as replacement of old splice bars and bolts, by cross-slotting the rail ends and by building up the ends of such rails as require this treatment.

Adzing Comes First

By W. H. Sparks
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

First and foremost among the items that should receive attention when rail is being laid, with a view to doing the work in such manner that its service life will be extended, is that of adzing the ties to receive the new rail. This work should be done with mechanical adzers for two reasons; first because they will do a better job than can possibly be done by hand; and, second, because three adzers operated by three men, with a maintainer and a bit grinder, will do as much work as 30 men can do by hand. The rail seat should be level and in the same plane for all ties, and for both ends of each tie. The rail can then be laid so that the wheels will have full contact with the running surface of the head and thus reduce the wear on the head. Nothing else in the rail-laying operation is so important as this, whether the rail is new or is released and being laid the second time.

Tie renewals have been eliminated from consideration by the question, but to my way of thinking this should not have been done, for the straightening and spacing of the ties will have an important bearing on the later performance and the service life of the rail. After the ties have been straightened and spaced, another item should

be given careful attention. This is the gaging of the rail. No matter how carefully this may be supervised while the rail is being laid, some irregularities will creep in, and these will be magnified as the ties are shifted in the straightening and spacing operation. All errors of gage should be corrected while the ties are being renewed and the track is being surfaced.

Good line will add to the life of the rail, as well as cause more comfortable riding, especially under high speeds. Irregular line causes lateral thrusts against the rail that destroys the line still further, affects the gage adversely and eventually creates poor surface. All of these defects have a detrimental effect on the rail and tend to shorten its service life, particularly in primary service.

After the new rail has been surfaced, the track should be gone over by a gang that follows about a day behind the surfacing gang to pick up and resurface spots where settlement has occurred. Then the track should be gone over in the same way about a week or ten days later to insure that the rail has a solid, even support. The ballast should be clean, sound and deep enough to insure continued support, and the shoulder should be dressed to give even, lateral support. Cuts should be given the best surface and subsurface drainage obtainable, so that the ballast will remain clean and the roadbed stable.

Anti-creepers should be applied as soon as the rail is bolted and spiked, for it must be so held that the expansion allowance will remain uniform and there will be no creeping. A loose bolt is no respecter of schedules, for which reason bolts must be well tightened when the rail is laid and retightened when they become loose, regardless of the number of weeks or months which may have elapsed since they were tightened previously.

Maintaining Air Compressors

What precautions in the operation and maintenance of air compressors will reduce the necessity for repairs and increase the service life of the equipment? Who should be responsible?

Lubrication Important

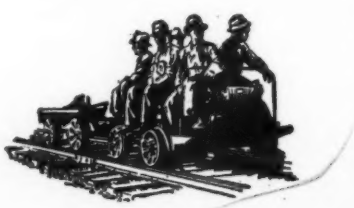
By C. H. R. Howe
Cost Engineer, Chesapeake & Ohio, Richmond, Va.

Primarily, lubrication is the most important factor in the operation of the machine and in preventing frequent overhauling. The use of cheap oils and greases should be avoided, as they are more costly in the long run. Gas-engine oils having a high-carbon residue result in sticking valves and fouled spark plugs. Regular crankcase drainage and replacement schedules should be established and followed. The cylinders and bearings of the machines tend to dry out if allowed to remain idle for a great length of time, for which reason, if out of service, the machines should be started up from time to time and run long enough to secure a redistribution of the lubricant.

Another point in compressor maintenance that should be watched is to see that the oil filters and air breathers are kept free and clean, so that they will function fully at all times. After each days work, water of condensation should be blown out, the air pressure released and the drain valves left open.

During freezing weather, care should be taken to see that the antifreeze content in the water jackets is kept to standard strength or, better still, use no anti-freeze compound and drain off the water at night. Providing a metal receptacle for the water and heating it before filling the jacket in the morning will expedite starting and avoid delays at the beginning of the day's work.

While the adjustments, care and running repairs are in the control of the machine operator, the responsibility for performance rests with the foreman or other supervisory officer. He should familiarize himself with the machine and with the manufacturer's manual which accompanies it. It may also be well for division and general officers to obtain first-hand knowledge of the equipment under their jurisdiction, as well as maintaining an up-to-date report system covering condition, performance, etc. It may be said that, in general, a dirty machine is apt to be indicative of its mechanical condition and prophetic of early-repair costs.



Lack of Knowledge

By Supervisor of Work Equipment

It is a generally accepted fact that 80 per cent of the trouble experienced with power machines and tools arises from lack of knowledge of the machines and inexperience on the part of the operators. An air compressor is no exception, and the first essential in reducing repairs is a thorough knowledge of their operation and care. Practically all of those used in maintenance of way work are under automatic control and require little attention while in actual operation. This must not be interpreted to mean, however, that such details as lubrication, packing, cleanliness and the necessary field adjustments can be neglected with impunity. The best assurance of good care and uninterrupted service is to assign one man to operate the compressor and give it the required attention, and make him responsible for its condition at all times. He should be instructed thoroughly in its operation and care. If different men are allowed to operate the equipment, no one can be held responsible, and conflicting ideas about how it should be handled will result inevitably in the neglect of some detail that may cause failure.

Among the details that must be given attention are lubrication, frequent inspection of moving parts and bearings, adjustments of moving parts and the tightening of loose bolts. The operator should have sufficient knowledge of the construction of the compressor to detect readily any irregularity which might interfere with functioning; and enough mechanical ability to make minor repairs and adjustments to forestall failure. As a rule, operators selected from track and bridge and building gangs are able to handle only the minor details of maintenance of way service. For example, many failures arise from fuel-ignition troubles. With the widespread familiarity with automobiles, it should not be difficult to find a man in the gang who is familiar with this and other simple details of operation, who can thus minimize failures. Any unusual sound while the compressor is running should be investigated at once and measures taken to correct it.

One of the most, if not the most, important details is lubrication. Lack of oil is responsible for more failures and damage than any one other cause. Furthermore, under no circumstances should an unsuitable lubricant be em-

ployed. A dirty machine invariably indicates poor maintenance and invites careless operation, while cleanliness is essential to inspection, lubrication and adjustment.

Adequate provision for the care of the compressor when not in use is of equal importance with that required when in service. In service, compressors are exposed to the elements, but there is no reason why they should not receive some protection when out of service. This applies particularly to protection from dust, dirt, cinders and corrosion. If the machine is to be out of service for an extended period, all parts subject to corrosion should be coated with oil, grease or rust preventive, and water should be drained, particularly in cold weather.

Renewing Ballast Decks

In view of the present difficulty of getting stress grades of timber, is it now desirable to renew ballast decks on bridges? Why? What other considerations are involved?

It Is Always Desirable

By General Inspector of Bridges

A creosoted ballast deck will rarely require any attention for many years after it is completed, except the regular inspections that should be made of every structure, to insure against external damage. On the other hand, the substructure of a timber trestle, that is, the piles and caps, may show signs of failure much earlier, usually in the form of splitting or decayed tops of the piles and crushing of the caps. Split piles can be cut out and posts inserted; piles decayed below the cutoff can be cut back and double-capped; and caps can be renewed as necessary, all without any considerable disturbance of the deck. If the substructure needs stiffening, as in some of the older structures, this can be done with additional bracing, using timber connectors to increase its effectiveness.

In general, the partial renewal of a ballast deck is so lacking in economy that it should not even be considered normally. The reason for this is that such repairs, eliminating damage, are rarely required until the bridge has been in service 25 or 30 years. Therefore, to place new material alongside the remaining timbers, which probably will not last more than 5 to 15 years, is sheer waste. Still assuming normal conditions, it will be far better to make a complete renewal of the deck, salvaging any material that may be fit for further use.

Usually, the bents in a ballast-deck trestle begin to fail before the deck does, but repairs such as those mentioned will generally permit the structure to be carried until the renewal of the deck is required. For this reason, the renewal of the deck means the renewal of the entire structure. Bearing these facts in mind, it is still preferable to renew a ballast deck in its entirety, but under present conditions, if sufficient timber to do so cannot be obtained, one must make a virtue of a necessity and do what must be done, regardless of other considerations.

Should Not Attempt

By Supervisor of Bridges and Buildings

It is never desirable to make piecemeal repairs to a ballast deck, as any one who has done so will readily testify. In the first place, it is a costly operation; in the second place, a satisfactory job can never be obtained; and in the third place, when it is finished one has an assembly of old and new timbers that have different load-carrying capacities as well as different reactions under loads. In addition, the potential service life of the old and new timbers may be widely divergent.

Stringers that have been in service 20 to 25 years, and even 30 years in some instances, will be worn somewhat or mashed slightly at the bearings, even if they are entirely sound, and unless the new stringers are framed to correspond with the height of the old stringers they will be called upon to assume an undue proportion of the load. In any event, the new timbers will be stiffer and have greater resistance to bending, so that again they will take more than their share of the load.

By the time that some of the stringers require renewal, both they and those that are to remain in the structure have given many years of service. Therefore, if new timber is put into the structure, it will have so much greater potential service life than the old stringers that this excess will be completely wasted, for when it is taken out, it can be used only as second-hand material. Even if second-hand material is employed for making the partial repairs, the cost of installing it will be excessive because of the amount of labor involved. Usable second-hand material is always in demand, and at present it commands nearly as high a premium as new material. For this reason, nothing will be lost by making a complete renewal of the ballast deck, for the salvaged material can be substituted for the same amount of new material in other structures as will be saved by making a partial renewal of the timbers in a ballast deck.

Common Errors in Painting

What are the most common errors in the application of paint? What are the effects? How can they be overcome?

Too Many Errors

By C. R. Knowles
Superintendent Water Service (Retired)
Illinois Central, Chicago

So many errors are committed in painting that space will not permit a discussion of more than a few, for they range from the purchase of poor quality or unsuitable paint to improper application; and from a poor system of programming to deferred painting. Most of those which will be mentioned are within the control of the men in the field.

There are many kinds of paints for as many purposes. Obviously, the right paint should be used on each job. Unfortunately, however, this elementary requirement is too often lost sight of or ignored, for some foremen go ahead and use any paint that will cover the surface. There is no universal paint, that is, one that will do as good a job on a station as on a bridge or on a concrete surface.

However, probably the most common as well as the most flagrant error is the assumption that in painting, the only thing that is necessary is to dip the brush in the paint and spread it over the surface to be painted. Employment of skilled painters, or patient instruction of new men, will do much to eliminate this error. Too

much railway painting is seasonal, and it is not always easy to hold skilled men, when only six to eight months work is available to them.

Another prevalent error is failure to prepare the surface to receive the paint. This applies particularly to failure to remove all loose, cracked, peeled and blistered paint, dirt and grease, or to know that the surface is thoroughly dry before it is painted. Neglect to mix the paint thoroughly and to keep it stirred is an almost universal error. This is as true of prepared paints as of those mixed on the job, for paint that has stood for some time needs thorough agitation, followed by almost constant stirring during application. The temperature of the surface to which the paint is being applied also has an influence on the success of the job. Atmospheric temperatures above 100 deg. are not uncommon in the South and Southwest, during which the steel in bridges may reach 150 deg. The protective qualities of paint are greatly reduced when applied at such temperatures.

A comprehensive painting program which will permit the force to be stabilized will go a long way in improving the quality of railway painting. Such a program should take into consideration climatic conditions; the volume of painting to be done; seasonal distribution of the work; and desirability of retaining experienced painters.

Can Be Corrected

By General Inspector of Buildings

It is my observation that the most common error in painting is failure to stir the paint. In the morning, before starting to paint, or when opening a new can of paint, the paint should be poured back and forth from one receptacle to another several times to insure a uniform dispersion of the pigment. The paint pigments in common use are heavier than the vehicle, for which reason they tend to settle, and the paint must be stirred at frequent intervals to hold them in uniform suspension.

Another common error is failure to brush out the paint sufficiently, resulting in a thick coat. A paint film should be as thin as the paint can be applied. Paint films that are too thick are prone to alligator, because the next coat is so often applied before the first has had time to dry. Another ill result of thick paint is a tendency to sag. On the other hand, crazing and cracking are the result of applying a hard coat over a more elastic coat; in other cases this also results in flaking and chipping. If the surface has moist spots, or if it has not been cleaned of grease, the paint is sure to blister.

Tacky paint may result from the use of poor material as the vehicle; from allowing good paint to remain too long in an open container; by applying the second coat before the first one is dry; or, in the case of varnish, by making the application over grease. Crawling may be caused by applying the paint at too low a temperature, making it impossible to brush it out thin, or by applying it to a highly polished surface.

What is the effect? The errors that have been mentioned, and others which would require too much space for their discussion, all result in a poor job initially and rapid deterioration of the paint. The remedy? Constant and better supervision; stabilization of the force to hold experienced painters; stop deferment of painting; and use good paints.

Conserving Distributed Ice

What practical means can be employed to conserve ice shipped to section, extra and bridge and building gangs?

Keep Shipments to Minimum

By L. L. Adams
Engineer Maintenance of Way, Louisville & Nashville, Louisville, Ky.

The first consideration is to reduce the shipments of ice to the minimum by obtaining it locally, so far as possible. When consideration is given to the loss of ice which occurs in shipping, and to the time lost by the forces in getting it from trains, the higher price that may have to be paid to have the ice delivered at the gang's headquarters shortly before starting time, can be more than justified. When ice must be shipped to a gang because there is no local supply, it should be shipped in blocks as large as possible and, when more than one point is to be served, the ice can be cut at the time of delivery.

If it is to be shipped a considerable distance, suitable containers should be provided to reduce melting to the minimum. The gang that is to receive the ice must know the time of arrival and arrange for it to be taken in charge when delivered, and must not allow it to lie on the platform until most of it is melted. When only a part of the ice is to be used upon receipt, some means of storage must be provided to reduce wastage as much as possible.

A Difficult Problem

By District Engineer

Conservation of ice under the conditions of distribution and use which obtain on a railway presents a most difficult problem, and a challenge to every user, to prevent unnecessary waste. Ice is more susceptible to waste than any other commodity, partly because it must be distributed so widely and partly because of the constant shrinkage it undergoes when subjected to temperatures above freezing. This will vary from 10 per cent to a total loss, depending on the care exercised in storage, distribution and use. Unfortunately, this waste seems to be considered a necessary and unavoidable evil, for observation indicates that in many cases little effort is put forth by the various departments in which it is used, to conserve the ice.

As with many other commodities used on the railways, this attitude is shaped, in part, by ignorance of the aggregate loss and expense thus created. Obviously, the relatively small amount of ice furnished to an individual gang represents only a small expense, but when this small item is multiplied by the number of gangs served the total becomes impressive. In fact, the road with which I am associated has paid out $700,000 a year for several years for the ice it requires for all purposes. The maintenance of way department uses approximately 10 per cent of this ice, or at the rate of more than $200 a day.

That part of the ice used by section and extra gangs and by bridge and building gangs presents a special problem with respect to reducing waste because of its wide and somewhat scattered distribution; the limited facilities for taking proper care of it; and the fact that it must of necessity be handled by many persons, often without adequate protection against high temperatures. The opportunities for waste are increased by the purchase at a great many points along the system, from which it is distributed to, literally, a multitude of points, many of them remote from the point of original shipment.

One of the principal losses occurs in ordering more ice than is needed, partly through force of habit. This

practice should be discouraged. For shipment, the ice should be protected in burlap bags and sawdust, or in insulated containers, and it should be kept away from the direct rays of the sun. It should be handled promptly upon receipt. It is not uncommon to see large pieces of ice melting away on a station platform or at a tool house, because some one failed to be on hand when it arrived, or because some one acted carelessly.

Another source of waste results from failure to notify the shipper when an extra gang or a bridge and building gang has been moved. Ice for outfit cars should be kept in well-insulated containers or in refrigerators and not in tubs or barrels. Where ice is kept in refrigerator cars, or at ice houses at terminals, the doors should be kept closed and locked, with strict control over the distribution to avoid misuse and unnecessary waste.

Control of ice consumption and reduction of waste are matters of competent supervision and while this responsibility rests upon the supervisor primarily, the individual user should by no means be absolved. Like all other cases of waste, if the matter is watched and controlled as it should be, a substantial reduction can be made in the waste of ice.

Teaching Safety Practices

How should bridge and building men be taught safety practices? Who should instruct them? What special attention, if any, should be given to new men?

Solution Not Simple

By Bridge Engineer

The wording of the question seems to imply that the situation is desperate, but that there is a means at hand for immediate alleviation. Neither of these implications is true. Accidents in which bridge and building men are involved are on the increase, but this is also true for other classifications of employees. The question also seems to imply that the solution of the problem is to be found in the teaching of safety practices. The solution is not so simple as this, however, for we are not dealing primarily with the engineering aspects of safety work, such as guarding machinery, protective equipment, ventilation, sanitation, clothing, etc.

What we are dealing with is men whose work requires that they lift and carry heavy loads over rough footing, up ladders, down embankments, over obstacles and under obstructions. They climb to high places with tools hanging from belts or clothing; they move over members in the process of being erected that do not afford safe footing or hand grabs; they must crawl into close quarters and all but inaccessible places, or move about on temporary staging.

I submit that there is little beyond the admonition to be careful that can be taught these men. There is little in the accepted safety rules to guide them. Of necessity, safety becomes inherent and instinctive with these men and develops into a natural aptitude. Why do these men meet with accidents? A misstep, a slip, a trip, a miscalculation, a momentary distraction, failure to keep alert, observant and thoughtful, in short, is a man-failure.

This may sound exceedingly pessimistic, but it is not my intention to imply that the situation is wholly hopeless. We are all astonished at the performance of a good team of horses and a capable driver in a pulling contest. It is the combination of driver and horses working together that pulls the load. All men are not good drivers or, to apply the illustration, good foremen.

Recent observation of a foreman handling a gang of about 40 men on a track raising and shifting job, disclosed that he handled these men, largely high-school boys, mixed in with regular section gangs, just as a good driver handles a pulling team. There was a constant chatter of directions all day long, as well as instructions, admonitions, warnings and encouragement, holding them together until the end of the long day, with a final check up at the home station. From there they were sent home as a group, with a final word to "go home and get your rest for tomorrow." He himself had started to work on the section as a boy 17 years old, and he literally made himself a pal to these young high-school boys. Teamwork is the answer to the question, and the foreman is the man to prevent accidents, but the rules by which this can be done are not in the book.

A great deal can be accomplished by making an honest, thorough and sincere investigation of every accident, to determine its exact cause, and the particular action which made it possible. A re-enactment of the circumstances with the other men involved, going through the exact steps both preceding and following the accident, will be helpful. This enables the men to see clearly how each accident is set up and leaves a lasting impression upon them. It also indicates that an honest effort is being made to show them how to avoid accidents.

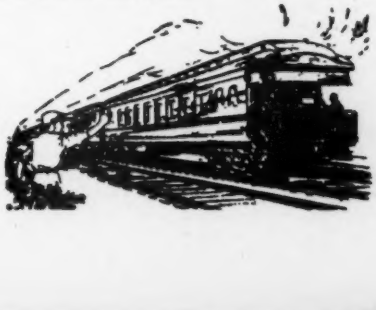
By Precept and Example

By Supervisor of Bridges and Buildings

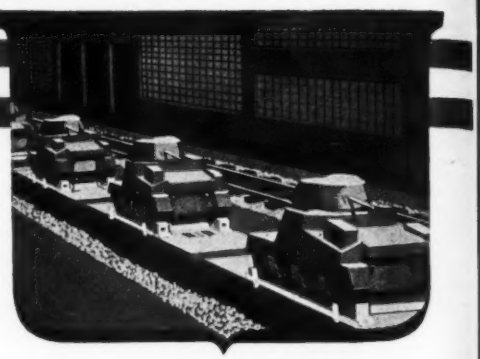
Three points need to be kept in mind always in connection with safety instruction: (1) men can be trained to be safety conscious at all times; (2) to do so, they must be taught by both precept and example; and (3) foreman must be sincerely interested in safety. In addition to this, the zeal of both foreman and men will be greatly influenced by the attitude of the supervisor who, in turn, will in some measure reflect that of the division engineer.

The army goes to great length to train the raw recruit in both military routine and how to act under a wide variety of usual and emergency conditions. This is done by both precept and example, until the lessons have registered in the rookie's mind to the extent that, to an extraordinary degree, he reacts consciously but automatically to each set of conditions when they confront him. While it is not contended that bridge and building men can be given anything like the intensive training that the prospective soldier gets, the principle underlying the training is exactly the same. However, their interest must be aroused and the instruction must be drilled into them constantly, until automatically they do or avoid doing the thing that spells safety or danger.

No man will ever be able to learn safety unless it be taught as a part of his work. Safety is not academic; it is practical. For this reason, no one else can do as good a job of teaching as the foreman, who is always with the gang and who plans and oversees the work. His work of teaching will be made easier and far more effective if he has the whole-hearted and active backing of his superiors all the way from the supervisor to the executive officers of his road.



NEWS of the Month



Sharp Reduction Proposed In Active Rail Sections

A special committee formed at the suggestion of the Office of Defense Transportation to study the possibility of standardizing rail sections has recommended a sharp reduction in the number of sections to be included in current rollings. A survey by the committee of the rail sections rolled in 1940 and 1941 showed that 45 different sections were purchased by the railways during those years while the mills are maintaining rolls for 61 different sections, ranging from 65 lb. to 152 lb. In all, more than 150 sets of rolls, not including duplicate sets and spares, are being maintained for the purpose of rolling these 61 sections as they are demanded.

The committee recommended the elimination for the duration of the war of 25 of the 61 sections for which rolls have been currently maintained. It also recommended the unrestricted rolling of 9 sections at all mills, and the limited rolling of the remaining 27 sections at a number of mills.

Rail Sections for Which Rolls are Being Maintained

Group 1 To be eliminated	Group 2 To be rolled without restrictions	Group 3 For limited rolling
152 PRR	131 AREA	152 PS
131 AREA	112 AREA	136 LV
Original section	100 AREA	132 AREA-HF
115 NYC	100 ARA-A	130 P.S.
110 GN	100 ARA-B	130 AREA
110 HF	90 ARA-A	130 AREA-HFB
100 NH	85 ASCE	127 Dudley
100 PRR	80 ASCE	115 D&RGW
100 Rdg	75 ASCE	113 AREA-HF
90 IRT		112 AREA-HF
90 GN		110 Chi. Surf.
90 ARA-HF		110 AREA
90 Santa Fe		107 NH
85 DRGW		105 Dudley
85 CP		105 DL&W
85 CBQ		100 ASCE
85 ARA-A		100 AREA-HF
80 ARA-B		100 ARA-HF
79.5 Friction-less		100 C&NW
		100 PS
75 IRT		90 ASCE
75 MP		90 C&NW
72 C&NW		90 ARA-B
70 NYC Conn.		85 MP
70 ARA-A		85 PS
70 ARA-B		80 ARA-A
65 ASCE		70 ASCE

In most cases, one or two mills can meet the needs for any of the sections for which limited rolling is recommended, and further benefits can be obtained if all of the requirements for any of these sections are filled in a single rolling. To insure this, the committee suggested that a limitation be established for the minimum tonnage to be rolled of any section. It also grouped the roads requiring the various sections of limited rollings as Eastern, Southern, Western and tributary to Chicago, with the suggestion that the rollings be made by the mill nearest the road or roads involved, provided it has rolls for the section.

Issue New List in Manpower Overhaul

Changes in the rules for inducting men under the Selective Service system were announced on August 14 by the War Manpower Commission as a means for holding essential workers in war-useful jobs, supplying men needed for the armed forces, and assuring transfer of workers to jobs aiding in the war effort. At the same time Otto S. Beyer, personnel director of the Office of Defense Transportation, issued a statement declaring that transportation workers will not be affected by the new rules. A man in this field is in an essential industry, he said, and "by staying put improves his draft status and also aids the war cause in his own skilled field."

The revised list of essential activities includes amendments that have been made from time to time since the original list was made public, it was stated. In addition to a few deletions from the original list, none of which affected transportation industries, changes consist of various additions within the categories previously established, including the addition of maintenance workers.

Better Steel Allotments for Railroads

The transportation industry will receive 1,380,000 tons of carbon steel for the fourth quarter of this year, according to an allocation made by the War Production Board's Requirements committee. This is an increase of 180,000 tons over the 1,200,000 tons allocated for the third quarter, and was appraised as a "substantial increase" in an August 9 announcement from the Office of Defense Transportation, which is claimant agency for transportation under the WPB's Controlled Materials Plan.

At the same time the ODT statement recapitulates the rail program to show that the carriers will have received a total of 1,527,000 tons of new replacement rail during the entire year 1943 as compared with 1,300,000 tons in 1942. The fourth-quarter allocation contemplates 400,000 tons of replacement rail and steel for an additional 9,500 freight cars, although most of them will not be completed until early in 1944.

Meanwhile, however, ODT had found it possible to provide for the production of an additional 5,801 new cars this year out of the steel allocated for the third quarter but not used for its original purpose. This was made known in an August 11 announcement, which pointed out that the 1943 production will thus total "upwards of 32,000 new cars," i.e., the 26,000 originally outhorized, plus the 5,801, plus such portion of the fourth-quarter's 9,500 that may be completed before the end of the year.

Nine Die When Train Hits Section Gang

Nine persons, including four boys of high-school age, were killed on August 2 when a Cleveland, Cincinnati, Chicago & St. Louis passenger train ran into a section gang near Nokomis, Ill. The men were working with tie tampers, the noise of which prevented them hearing the train.

N. Y. C. First Eastern Road to Import Mexicans

On August 18, the New York Central System received 749 Mexican track workers, the first Eastern railroad to employ imported Mexican workers under terms of the treaty or convention between the governments

of the United States and Mexico. The conditions and agreements under which these workers were imported are similar to those reported for the Southwestern roads in the June issue.

Non-Op Wage Case Settlement Is Reached

An agreement for the settlement of the controversy involving wage-increase demands of non-operating railroad employees was reached last month during conferences at Washington, D.C., between representatives of 15 non-operating unions and the three regional carriers conference committees. Details of the settlement were not made public, pending submission of the proposed agreement to the "government", but it was reported to involve giving different employee groups varying adjustments which will increase the annual wage bill about as much as would the straight eight cents per hour increase recommended recently by a National Railway Labor panel emergency board, and later set aside by Economic Stabilization Director Fred M. Vinson.

Railroads Report Rise in Employment

Railroad employment increased 0.44 per cent—from 1,381,560 to 1,387,654—from mid-June to mid-July, while the July total was 5.4 per cent greater than the comparable 1942 figure, according to the latest summary of preliminary reports prepared by the Interstate Commerce Commission's Bureau of Transport Economics and Statistics. July employment was slightly above June's in all groups except train and engine service, which was down 0.4 per cent. All groups except maintenance of way and structures (down 1.4 per cent) were above July, 1942.

A.R.E.A. Revises Tests for Mauls, Sledges and Chisels

The American Railway Engineering Association, effective August 15, has adopted emergency provisions providing for a reduction in the number of test specimens required in the testing of spike mauls, sledges and track chisels, as set forth in its specifications. Heretofore, the standard test prescribed was required for one tool in each lot of 10 dozen or less, whereas under the emergency provisions, no test is required in lots of less than 120. Furthermore, only one sample need be tested in lots of 120 to 500, and thereafter from each lot of 500 or fraction thereof.

Personal Mention

General

Willard Hugh Kyle, acting superintendent of the Montreal terminals of the Canadian National, and an engineer by training and experience, has been appointed superintendent of the Montreal terminals and the St. Jerome division, with jurisdiction also over the new Canadian National station. Mr. Kyle entered railway service in May, 1924, as a chainman in the office of the general superintendent of the Canadian National at Montreal, Que., and in 1926 he was promoted to instrumentman, becoming assistant engineer in 1929. Mr. Kyle was promoted to division engineer in the transportation department in March, 1939, and in October, 1942, he was appointed acting superintendent of the Montreal terminals.

Edward W. Chapman, assistant division superintendent of the Canadian National at Edmundston, N. B., and an engineer by training and experience, has been promoted to superintendent of terminals, with headquarters at Sydney, N. S. Mr. Chapman was born at Dartmouth, N. S., on September 17, 1890, and entered the service of the Canadian Government Railways as a transitman at Truro, N. S., on July 7, 1914. In January, 1916, he enlisted for overseas military service in the first World War, returning as transitman at Truro in June, 1919. He became an instrumentman at New Glasgow, N. S., in June, 1923, and in November, 1927, he was promoted to division engineer at Edmundston, N. B. He became assistant superintendent in March, 1942, serving in that capacity until his new appointment.

Emil J. Foug, who has been employed on railroad construction for the U. S. Naval Ammunition depot at Crane, Ind., since February, 1941, has been appointed superintendent of railroads of the depot. Mr. Foug entered railway service in 1917 as a section and extra gang timekeeper on the Chicago & North Western at Milwaukee. In June, 1926, he went with the Chicago, Milwaukee, St. Paul & Pacific at the same point as roadmaster's clerk and timekeeper, later serving successively as track laborer, material accountant, instrumentman, assistant foreman, foreman, general foreman and general inspector. In February, 1941, Mr. Foug was sent to Burns City, Ind., to construct the railroad to serve the U. S. Naval Ammunition depot.

Engineering

Leland Clapper, assistant chief engineer of the Duluth, Missabe & Iron Range, has been promoted to chief engineer, with headquarters as before at Duluth, Minn., succeeding **Elbert H. Dresser,** whose recent death is reported elsewhere in this issue. Mr. Clapper was born at Washington, Iowa, on July 31, 1886, and attended Iowa State College and Massachusetts Institute of Technology. He entered railway service on May 1, 1906, as a draftsman on the Great Northern, subsequently serving as rodman and assistant engineer at Superior, Wis., and St. Paul, Minn. In May, 1910, Mr. Clapper was appointed assistant engineer of the Duluth, Missabe & Northern (now the D. M. & I. R.), with headquarters at Two Harbors, Minn., and later served as engineer of bridges and buildings and principal assistant engineer, with headquarters at Duluth. Early in 1937 he was promoted to the position he held at the time of his new appointment.

W. B. Friend has been appointed right-of-way agent of the Norfolk & Western, with headquarters at Roanoke, Va., succeeding **W. F. Genheimer,** who has retired.

M. B. Davis, supervisor of track on the Illinois Central at Kankakee, Ill., has been promoted to division engineer, with headquarters at Waterloo, Iowa, succeeding **T. M. Pittman,** who has been transferred to Memphis, Tenn., replacing **Charles A. Maynor,** who has retired.

L. W. Perry has been appointed assistant to the timber engineer of the New York Central, with headquarters at New York, and **L. M. Slattery** has been appointed general lumber and tie inspector, with headquarters at Cleveland, Ohio.

W. O. Cudworth, assistant engineer maintenance of way of the Canadian Pacific, with headquarters at Toronto, Ont., has been promoted to engineer maintenance of way, Eastern lines, with the same headquarters, succeeding **Lt.-Col. Blair Ripley,** who has been assigned to special duties. **George W. Miller,** division engineer, will succeed Mr. Cudworth as assistant engineer maintenance of way at Toronto.

L. A. Loggins, assistant supervisor of bridges and buildngs on the Houston division of the Southern Pacific Lines in Texas & Louisiana at Houston, Tex., has been promoted to division engineer of the Victoria division, with headquarters at Victoria, Tex., succeeding **C. N. Billings,** who has been transferred to the Dallas division, with headquarters at Ennis, Tex., replacing **H. Slabotsky,** whose death on July 30 is reported elsewhere in these columns.

Charles McDiarmid has been appointed chief engineer of the Georgia & Florida, with headquarters at Augusta, Ga., succeeding **H. B. Holmes,** who has retired at his own request. The position of assistant chief engineer, formerly held by Mr. McDiarmid, has been abolished.

Mr. Holmes was born at Ferris, Ill., on July 13, 1875, and attended the University of Iowa. During summer vacations in 1899 and 1900, Mr. Holmes served as rodman, chainman and timekeeper on the Chicago, Burlington & Quincy. Subsequently he served as rodman, topographer, levelman, transitman, office engineer, and assistant to the superintendent of construction of the Kansas City, Mexico & Orient in Mexico, and as resident engineer of the Chihuahau & Pacific. In 1910 he was appointed assistant to the chief engineer of the Kansas City, Mexico & Orient at Kansas City, Mo., and in 1913 he became resident engineer, being advanced to chief engineer in February,

1917. Later in 1917, Mr. Holmes became a consulting engineer on the staff of Coverdale & Colpitts, engineers, at New York, becoming principal assistant engineer in charge of the New York office of that firm in 1918. In 1920 he went with the Pittsburgh & West Virginia as chief engineer, with headquarters at Pittsburgh, Pa., and in 1923 he became consulting engineer at Pittsburgh. In 1926, Mr. Holmes joined the staff of the Georgia & Florida as chief engineer at Augusta, remaining in that capacity until his retirement effective July 1.

Page P. Wagner, whose promotion to engineer assistant to the chief executive of the Missouri Pacific, with headquarters at St. Louis, Mo., was reported in the July issue of *Railway Engineering and Maintenance* was born at Concordia, Kan., on December 6, 1894, and is a graduate of the University of Kansas. He entered railway service in 1917 as a rodman on the Missouri Pacific at Wynne, Ark., and from May, 1918, to January, 1919, he served with the U. S. Army as a second lieutenant. In March, 1919, Mr. Wagner went with the El Tigre Mining Company, Sonora, Mexico, returning to the Missouri Pacific in October, 1921, and serving as rodman and instrumentman at Wynne, Ark., Monroe, La., and Atchison, Kan. In 1925 he was appointed a draftsman in the office of the engineer of design, with headquarters at St. Louis, and in the same year he was promoted to assistant engineer, serving in that capacity at various points on the road. In July, 1937, Mr. Wagner became acting division engineer of the Wichita division, with headquarters at Wichita, Kan., and one year later he was advanced to division engineer of the St. Louis Terminal and the Illinois divisions of the Missouri Pacific and the Missouri-Illinois (a subsidiary of the M. P.), the position he held at the time of his new appointment.

Page P. Wagner

Track

W. R. Pruitt, assistant supervisor of track on the Illinois Central at Louisville, Ky., has been promoted to supervisor of track, with headquarters at Princeton, Ky., succeeding **J. H. Dame,** who has been transferred to Dyersburg, Tenn., replacing **I. D. Holmes,** who has been granted a leave of absence. **W. N. Young,** general foreman at Vicksburg, Miss., has been advanced to acting supervisor of track, with headquarters at Jackson, Miss., succeeding **E. L. Caldwell,** who has been granted a leave of absence, effective September 1.

James A. Toliver, whose promotion to roadmaster on the Pecos division of the Atchison, Topeka & Santa Fe, with headquarters at Clovis, N.M., was reported in the July issue of *Railway Engineering and Maintenance* was born at Gatesville, Tex., on September 8, 1892, and entered railway service on May 7, 1917, as a section laborer on the Pecos division. On January 1, 1922, he was advanced to section foreman and at various periods between 1922 and 1940 he also served as extra gang foreman and steel gang foreman. On October 1, 1940, Mr. Toliver was promoted to track supervisor on the Pecos division, holding that position until his new appointment, effective June 18.

W. N. Rice, whose promotion tc supervisor of track on the Illinois Central, with headquarters at Waterloo, Iowa, was reported in the June issue, was born at Frankfort, Ky., on July 7, 1895, and studied a correspondence school course in railroad engineering and an extension course of the University of Kentucky. He entered railway service in September, 1916, as a chainman on the Kentucky division of the I.C., later serving as a rodman on the Springfield division and then being furloughed for military service. In January, 1919, he returned to the I.C. as a rodman on the Kentucky division and in July, 1921, he was transferred to the construction department, serving as an instrumentman in Kentucky and as office engineer on the construction of the Edgewood line. In January, 1929, Mr. Rice was appointed instrumentman on the Chicago Terminal division and in October, 1931, he was transferred to Ft. Dodge, Iowa. Nine years later, he was appointed acting supervisor of track at Freeport, Ill., which position he held until his recent promotion, effective May 1.

W. Amsbury, roadmaster on the Chicago, Rock Island & Pacific, at Estherville, Iowa, has been transferred to Manly, Iowa, succeeding **R. W. Lucas,** who has been transferred to LaSalle, Ill. **A. Stamos,** roadmaster at LaSalle, has been transferred to Estherville, replacing Mr. Amsbury.

V. E. Pearson, roadmaster on the Southern Pacific at Truckee, Cal., has been transferred to Sacramento, Cal., succeeding **R. Z. McCarthy,** deceased. **T. J. Vansandt,** roadmaster at Glendale, Ore., has been transferred to Truckee, replacing Mr. Pearson.

J. M. Reddy, roadmaster on the Southern Pacific at Elko, Nev., has been transferred to Ogden, Utah, succeeding **H. F. Elliott,** who has been assigned to other duties. **A. L. Campbell,** roadmaster at Alturas, Cal., has been transferred to Elko, replacing Mr. Reddy.

E. L. Anderson, extra gang foreman on the Missouri Pacific, has been promoted to roadmaster, with headquarters as before at Wichita, Kan., succeeding **W. H. Shideler,** who has been transferred to Yates Center, Kan., replacing **C. H. Hanson,** who has resigned.

Bridge and Building

William H. Pryor, whose promotion to general foreman of bridges and buildings-water service on the Southern division of the St. Louis-San Francisco (Frisco) was reported in the August issue, was born at Knoble, Ark., on November 20, 1886, and entered railway service in the bridge and building department of the Frisco on November 4, 1905, working in various capacities until 1908 when he was advanced to water service foreman of the River division. In February, 1917, he was promoted to assistant superintendent of water service, with headquarters at Springfield, Mo., and one year later that position was abolished and he returned to the River division as water service foreman.

Frank R. Judd, engineer of buildings of the Illinois Central, with headquarters at Chicago, has retired after 44 years service. Mr. Judd was born at Hamilton, Ont., on May 28, 1882, and entered railway service in June, 1899, as machinist's assistant for the Pullman Company, Chicago. In 1900 he became a map draftsman on the Illinois Central, subsequently serving as chainman, rodman and instrumentman at various points. In 1902 he was appointed a rodman on the Chicago, Rock Island & Pacific at Arlington, Tex., and in 1903 he returned to the Illinois Central as a draftsman and designer, with headquarters at Chicago. Mr. Judd resigned one year later to become a draftsman for the Crane Company, Chicago. In 1909 he again returned to the I. C., as a draftsman, and one year later he was advanced to chief draftsman, bridge department, at Chicago. In December, 1913, he was promoted to assistant engineer in charge of the Memphis Terminal and track elevation, with headquarters at Memphis, Tenn., and in February, 1915, he was appointed assistant engineer on special surveys. In October of the same year he became engineer of buildings.

Oscar L. Brion, scale inspector on the Pennsylvania division of the New York Central, with headquarters at Jersey Shore, Pa., has been promoted to general scale inspector of the Lines Buffalo and East, including the Boston & Albany, with headquarters at New York.

James J. Healey has been appointed assistant supervisor of bridges and buildings of the Terminal division of the Boston & Maine, with headquarters at Boston, Mass., to succeed **Jacob S. Andrews,** who has been promoted to supervisor of welding with the same headquarters, to replace **Richard E. Sampson,** granted a furlough.

Arthur N. Matthews, whose promotion to general foreman of bridges and buildings-water service on the Northern division of the St. Louis-San Francisco (Frisco) was reported in the August issue, was born at Trading Post, Kan., on January 19, 1882, and entered railway service in 1906 as a bridge and building helper on the Frisco at Fort Scott, Kan.

(Continued on page 67

Anticipate the challenge of post-war competition; redesign your equipment now and use more Timken Bearings.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

The use of Timken Tapered Roller Bearings in section cars is as important in its way as their application in main line locomotives, cars and streamlined trains.

All need their smoothness of operation; radial, thrust and combined load capacity; endurance; simplicity of lubrication; prevention of hot axles with attendant delays; and radical reduction of time out for maintenance.

No matter how well a section car may be designed and built in other respects, it still is dependent upon its bearings to a very great extent for efficient, dependable performance. Specify Timken Bearings when buying new section cars of any kind. The Timken Roller Bearing Company, Canton, Ohio.

On November 22, 1910, he was advanced to bridge and building foreman, and on July 15, 1929, to general bridge and building foreman of the River division. In 1932 that position was abolished and Mr. Matthews returned to Fort Scott as bridge and building foreman. In May of the same year he was advanced to foreman of water service, with the same headquarters, holding that position until his new appointment, effective July 16.

Obituary

Charles S. Krick, an engineer by training and experience, who retired as vice-president of the Eastern region of the Pennsylvania in 1936, died on July 29 at the age of 77.

Harry Slabotsky, division engineer on the Dallas division of the Southern Pacific Lines in Texas & Louisiana, with headquarters at Ennis, Tex., died on July 30. Mr. Slabotsky was born near Odessa, Russia, on March 31, 1885, and graduated from Louisiana State University in 1906. He entered railroad service on July 16, 1906, as a rodman of the Louisiana Western (now part of the Southern Pacific Lines In Texas and Louisiana), and a short time later went with Morgan's Louisiana and Texas (now part of the Southern Pacific Lines In Texas and Louisiana), where he served as levelman, draftsman, instrumentman, office engineer, head instrumentman and assistant division engineer. On January 1, 1920, Mr. Slabotsky was promoted to the position he held at the time of his death.

Elbert H. Dresser, chief engineer of the Duluth, Missabe & Iron Range, with headquarters at Duluth, Minn., died at his home in that city recently. Mr. Dresser was born on October 9, 1878, at Jefferson, Iowa, and attended Rensselaer Polytechnic Institute. He entered railway service in September, 1899, in the engineering department of the Duluth, Missabe & Northern (now the D. M. & I. R.), continuing with that road until 1918 and advancing during that time through various positions to that of division engineer. Upon his return from military service during World War I in 1919, Mr. Dresser engaged in general contracting in the Ranger district of Texas, and in the following year he became president of the Polaris Concrete Products Company, Duluth. On January 16, 1928, he returned to the D. M. & I. R. as chief engineer, the position he held at the time of his death.

Ralph D. Tobien, assistant to the chief engineer of the Southern, with headquarters at Washington, D. C., died at his home in Mountain Brook, Ala., on August 15. Mr. Tobien was born at Cleveland, Ohio, on September 27, 1880, and entered railway service in 1902 as an assistant engineer of the Erie, with headquarters at Cleveland. In 1903 he became an assistant engineer of the New York Central at Alliance, Ohio, and later in the same year he was appointed office engineer of the Chicago, Burlington & Quincy, with headquarters at Chicago. On May 26, 1905, Mr. Tobien was appointed roadway engineer on the Southern at Birmingham, Ala., and in 1906 he was appointed office engineer, with headquarters at Washington, D. C. In 1911 he was advanced to engineer maintenance of way, with the same headquarters, and on August 1, 1934, he was promoted to assistant to the chief engineer of the Western lines at Birmingham. In 1937 he was appointed assistant general manager of the Western lines, with the same headquarters, and in November, 1942, he was advanced to the position he held at the time of his death.

Supply Trade News

General

The Worthington Pump & Machinery Corporation, Harrison, N.J., has acquired the Ransome Machinery Company, Dunellen, N.J., as a wholly owned subsidiary. The Ransome company manufactures concrete mixers, road paving equipment, welding positioners and turning rolls.

The name of the **Creepcheck Company,** Pittsburgh, Pa., has been changed to the **Unit Rail Anchor Company, Inc.,** a wholly-owned subsidiary of Hubbard & Co., Tool division, Pittsburgh. **N. A. Howell** has been appointed district sales manager, with headquarters at Chicago, and **H. M. Fetterolf,** has been appointed special representative, with headquarters at Pittsburgh.

Mr. Howell, was born on May 19, 1891, at Temple, Texas, and received his higher education in engineering at the University of Mississippi. Upon leaving the university in 1915, he engaged in highway construction with the Washington County Highway department in Mississippi, later being employed by several local drainage districts. In February, 1917, Mr. Howell entered the employ of the Illinois Central as a rodman at Dubuque, Ia., working in this capacity until April 1918 when he entered army service. After serving 18 months in the army, more than 15 of which were spent in France with the 32nd Engineers, Mr. Howell re-entered the service of the Illinois Central as an instrumentman, with headquarters at Chicago. In February, 1927, Mr. Howell left the Illinois Central to become sales engineer of the Creepcheck Company, with headquarters at Chicago, which position he held until his recent promotion to district sales manager of the Unit Rail Anchor Company, Inc.

Personal

W. H. Cordes, advertising manager of the **American Steel & Wire Co.,** a subsidiary of the United States Steel Corporation, has been appointed to head a newly-created sales research and development division of the company. Mr. Cordes has been associated with the American Steel & Wire Co. for thirty years and has been manager of sales promotion and advertising since 1935.

C. N. Guerasimoff, assistant chief engineer of the **Buda Company,** Harvey, Ill., has been promoted to chief engineer of the engine division. Mr. Guerasimoff has been with the Buda Company for nine years, during which he has served as mathematician, engineer on stress analysis, design engineer on gasoline and Diesel engines, and assistant chief engineer in charge of the Radial Diesel Engine division.

John V. Houston, assistant chief engineer at the Chicago plant of the Ramapo Ajax Division of the American Brake Shoe Company, has been appointed general superintendent of Ramapo Ajax, with headquarters at New York. He succeeds **J. G. Tattersall,** who has been appointed assistant to the vice-president, with headquarters at Niagara Falls, N.Y. Following his graduation as a civil engineer from the University of Illinois in 1909, Mr. Houston was employed in the engineering department of the Chicago, Milwaukee, St. Paul & Pacific. In 1910 he joined the Ajax Forge Company which became a part of Ramapo Ajax in 1922.

John V. Houston

Albert S. Fromm, advertising manager of the **Union Metal Manufacturing Company,** Canton, Ohio, became mayor of that city on August 2, following the death of Mayor Ed S. Folk. Mr. Fromm has been president of the city council since 1939. During the remainder of the year, while he completes the term of Mr. Folk, Mr. Fromm will continue as advertising manager of Union Metal on a part-time basis.

E. W. Scarritt has been appointed sales manager of the **Elgin Softener Corporation,** Elgin, Ill. Mr. Scarritt is a vice-president of the company, with which he has been associated since 1927.

John Easton has been appointed director of development and standardization activities of the **Whiting Corporation** to succeed **A. J. Brown,** who has been transferred to California as manager of the Pacific coast branch.

Ralph J. Cordiner has been appointed assistant to the president of the **General Electric Company.** Mr. Cordiner, who resigned in June as vice-chairman of the War Production Board, was formerly president of Schick, Inc., of Stamford, Conn., and, prior thereto, manager of the appliance and merchandise department of the General Electric Company.

(Continued on page 680)

Designed for the job
Built for the years!

CHAMPION OF TRACK SHOVELS!

The "Wood" Brand Closed Back Track Shovel meets A. R. E. A. specifications as to blade dimensions, heat treatment and handle requirements. It is a real champion . . . built to stand up and take it . . . hard on the job and easy on the man.

THE STEEL I-BEAM HANDLE REINFORCEMENT

Protects the shovel handle at the point above socket where 65% of breaks occur.

THE WOOD SHOVEL AND TOOL CO.

PIQUA, OHIO

A NATIONAL ORGANIZATION

SPECIALIZING EXCLUSIVELY IN SHOVELS, SPADES AND SCOOPS

Frederick A. Preston has been elected chairman of the **P. & M. Company** and the **Maintenance Equipment Company,** Chicago. **Max K. Ruppert,** vice-president of the P. & M. Company, has been elected president of that company, succeeding Mr. Preston. **H. G. Warr,** chief engineer, has been elected vice-president in charge of engineering and **John E. Mahoney,** Chicago district sales agent, has been appointed assistant general sales manager. All appointments were effective August 1.

Mr. Preston was born at Evansville, Ind., on March 10, 1884, and graduated from Yale university in 1906, since which time he has been with the P. & M. Company and associated companies. During World War I, Mr. Preston served in the U. S. Army Air Service as a major. Since 1931, he has been president and a director of the P. & M. Company. Since April

Frederick A. Preston

27, 1926, he has also been president of the Maintenance Equipment Company, a company he helped organize. Mr. Preston has also been active in civic and philanthropic affairs, serving as chairman of the Chicago Community Fund Campaign in 1934, and as president of the Park Board, Lake Forest, Ill., from 1929 to 1940. Mr. Preston was president of the Track Sup-

Max K. Ruppert

ply Association in 1915-16. At present he is serving as chief of advisory board of the Chicago Ordnance district, U. S. War Department.

Mr. Ruppert was born at Grand Rapids, Mich., on June 5, 1899, and graduated from the New Mexico Military Institute, Roswell, N.M., after which he served one year there as an instructor. He then

H. G. Warr

went with the Chicago, Rock Island & Pacific as a chainman, later serving as rodman, ballast inspector and rail inspector. In June, 1922, Mr. Ruppert went with the P. & M. Company as a foundry inspector, he was promoted into the sales department in 1923 and was advanced to assistant general sales manager in 1926. In 1928 he was appointed assistant eastern manager at New York and in 1931 he was elected vice-president of the P. & M. Com-

John E. Mahoney

pany at New York, which position he held until his recent promotion.

Mr. Warr was born in Chicago in March, 1883, and studied engineering at Lewis Institute. He went with the P. & M. Company in 1913 and in 1918 was appointed company engineer. In 1921 he was made assistant general manager and in 1930 he was promoted to chief engineer, which position he held until his recent election as vice-president in charge of engineering.

Mr. Mahoney was born on November 23, 1893, and entered railway service in the maintenance of way department of the Illinois Central in June, 1910. On November 1, 1912, he went with the P. & M. Company as a material inspector and in 1914 he was transferred to the sales department. In 1937 he was promoted to Chicago district sales agent, which position he held at the time of his new promotion.

Thomas E. Rodman, vice-president of the **Maintenance Equipment Company,** has been elected president of that company, succeeding Mr. Preston, whose election as chairman of the P. & M. Company and the Maintenance Equipment Company, Chicago, is reported elsewhere in these columns. **Emmons Overmier,** chief engineer of the Maintenance Equipment Company, has been elected vice-president in charge of engineering and **P. A. Wells, Jr.,** assistant chief engineer, has been elected also secretary and treasurer. All appointments were effective August 1.

Mr. Rodman was born at Philadelphia, Pa., on February 6, 1885, and graduated in mechanical engineering from the University of Pennsylvania in 1906. He worked several summers between terms at college on location work for the Norfolk & Western and the Philadelphia &

Thomas E. Rodman

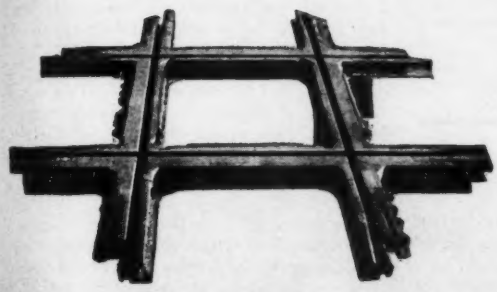
Westchester Traction Company. After graduation from college he became assistant to the vice-president in charge of design and construction of the Atlantic Refining Company, Philadelphia, Pa., and in June, 1909, he became chief engineer and assistant general manager of the Trinidad Lake Asphalt Company and associated oil companies at Brighton Trinidad, B. W. I. In 1912 Mr. Rodman returned to Philadelphia as a partner of A. R. Brunker & Co., steel castings, and three years later he became sales manager and vice-president of Atlantic Steel Castings, Chester, Pa. In 1920 he went with the Eastern Steel Castings Company, Newark, N.J., as manager of sales, and in 1923 he became assistant to the executive vice-president of the Bradford Corporation, Chicago. In 1928, Mr. Rodman went with the Maintenance Equipment Company as general manager, later being elected vice-president, which position he held until his recent promotion. Mr. Rodman was president of the National Railway Appliances Association in 1939.

Mr. Overmier was graduated in mechanical engineering from the University of Illinois in 1913 and, after an additional semester of post graduate work in heat engines, he went with the Packard Motor Car Company, Detroit, Mich., as a special apprentice in shop management. In the spring of 1917, he went with the Burr

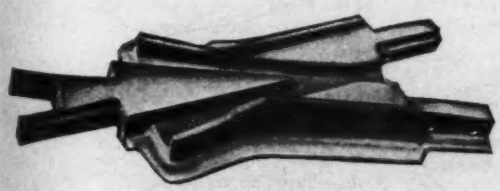
(Continued on page 682)

Courtesy of Pennsylvania Railroad

WHAT STEEL COMPANY FIRST USED MANGANESE STEEL FOR TRACKWORK?



Crossing made of Solid TISCO Manganese Steel



TISCO Manganese Steel Frog

WHEN electric cars replaced horse cars back in the nineties, a new trackwork problem was presented. Switches, frogs and crossings were giving way under impact of the heavier vehicles. A steel with unusual resistance to both shock and wear was urgently needed.

TISCO Hadfield's Manganese Steel provided the answer. Frogs installed by the Brooklyn Atlantic Avenue Street Railway in 1894, withstood the impact of a heavy trolley every 27 seconds and quickly proved their worth. The first railroad to adopt TISCO Manganese Steel trackwork was the Pennsylvania, in 1900.

Today, after 50 years, TISCO Hadfield's Manganese Steel is famous throughout the world for use on special trackwork, as well as mine and quarry equipment—power shovels and dredges—paper-making machinery and other industrial applications requiring utmost resistance to heavy abrasion and impact.

FOUNDED TW 1742

Taylor-Wharton Products

MANGANESE STEEL CASTINGS
HIGH PRESSURE GAS CYLINDERS
ALNICO PERMANENT MAGNETS
ALLOY CASTINGS AND FORGINGS
MANGANESE-NICKEL WELDING ROD
SPECIAL TRACKWORK

Taylor-Wharton Iron and Steel Co.

HIGH BRIDGE, NEW JERSEY • EASTON, PENNSYLVANIA

Company, Champaign, Ill., as assistant shop superintendent and the following year he went with the Standard Oil Company of Indiana in the engineering department of the Whiting, Ind., refinery, being promoted to assistant to the mechanical superintendent at the refinery a year later. In January, 1921, Mr. Overmier went with the Maintenance Equip-

Emmons Overmier

ment Company as engineer, subsequently being promoted to chief engineer and secretary and treasurer, which positions he held until his election as vice-president in charge of engineering.

Mr. Wells was born in Oak Park, Ill., on May 17, 1910, and studied civil engineering at the University of Illinois. He was engaged in general construction work until September, 1935, when he went with the Maintenance Equipment Company as

P. A. Wells, Jr.

a draftsman. In January, 1940, he was made a service engineer and in January, 1943, he was advanced to assistant chief engineer, which title he still holds in addition to his duties as secretary-treasurer of the company.

E. A. Condit, vice-president of **The Rail Joint Company, Inc.,** with headquarters at New York, has been elected president, with the same headquarters, to succeed **V. C. Armstrong,** who becomes chairman of the board, and **Alex Chapman,** western sales manager, at Chicago, has been elected vice-president, with the same headquarters. **William Gadd,** assistant eastern sales manager, at New York, has been promoted to eastern sales manager, with the same headquarters, succeeding R. R. Seward, whose death on July 3 was reported in the August issue, and **H. C. Hickey,** assistant western sales manager, at Chicago, has been advanced to western sales manager, with the same headquarters.

Mr. Condit joined the engineering department of the Rail Joint Company, Inc., in 1902. He went to Pittsburgh, Pa., for the company in 1905 and was appointed sales manager, with headquarters in New York, in 1918. He was elected vice-president in 1925. Mr. Armstrong entered the sales department of the Rail Joint Company in 1903; he was appointed sales manager in 1906, and was elected president in 1917. Mr. Chapman began service with the company in 1903 in the engineering and inspection department; he joined the company's sales office at Chicago in 1914 and was appointed western sales manager in 1938. Mr. Gadd entered the service of the Rail Joint Company in 1920 as an inspector at Philadelphia, Pa.; in 1927, he was appointed a representative with headquarters at New York, holding this position until June 1 of this year when he was made assistant eastern sales manager. Mr. Hickey entered the service of the company in 1919, and has served in various capacities at Chicago since 1925.

Association News

Maintenance of Way Club of Chicago

In the interest of programming the most helpful meetings in the history of the club, the Executive committee met in Chicago on July 30 to formulate plans for the coming season. Arrangements have been made to continue to meet in the Ambassador room of Huyler's Restaurant in the Straus Building, 310 S. Michigan Ave., and the first fall meeting will be held on October 25.

Bridge and Building Association

In place of its usual three-day annual meeting, which was scheduled to be held in Chicago on October 19-21, the Executive committee of the association is now considering either a two-day war-time conference on October 20-21, with an intensive program featuring addresses and reports on the most acute problems facing bridge, building and water service men, or a one-day business meeting of the Executive committee, on October 20, to receive and act upon the reports of the committees and to organize the work for the ensuing year. Decision in this regard is expected soon. In either case, railway men in the environs of Chicago will be urged to attend, the invitation being broadened to include key men on the railways of the country generally in the event the two-day war-time conference is held.

At the meeting of the Executive committee in Chicago on August 23, detailed consideration was given to this matter, together with a preliminary review of the technical reports on which committees have been working for the last year, all of which are approaching completion.

Roadmasters' Association

Replacing its usual three-day annual meeting, which was scheduled to be held in Chicago on September 14-16, the association will hold a one-day business meeting of its Executive committee, the chairmen and members of all technical committees and such other members as find it possible to attend, to receive and act upon the reports of the committees and to organize the work for the ensuing year. This one-day meeting will be held on September 15 at the Sherman Hotel. The reports to be presented are as follows: Getting the Most From Ties; Educating Track Forces in the Salvage of Materials; Saving Labor Through the More Intensive Use of Equipment; Extending the Life of Switches, Frogs and Crossings; Housing Track Labor; and Reducing the Use of Revenue Cars in Non-Revenue Service. Following the meeting, it is planned to publish the usual proceedings and to make them available to members at the earliest possible date.

American Railway Engineering Association

No standing committees of the association held meetings in August, but four committees have scheduled meetings in September—Maintenance of Way Work Equipment, at Chicago on September 13-14; Track, at Chicago on September 16; Economics of Railway Location and Operation, at Cleveland, Ohio, on September 21-22; and Roadway and Ballast, at Chicago on September 29-30.

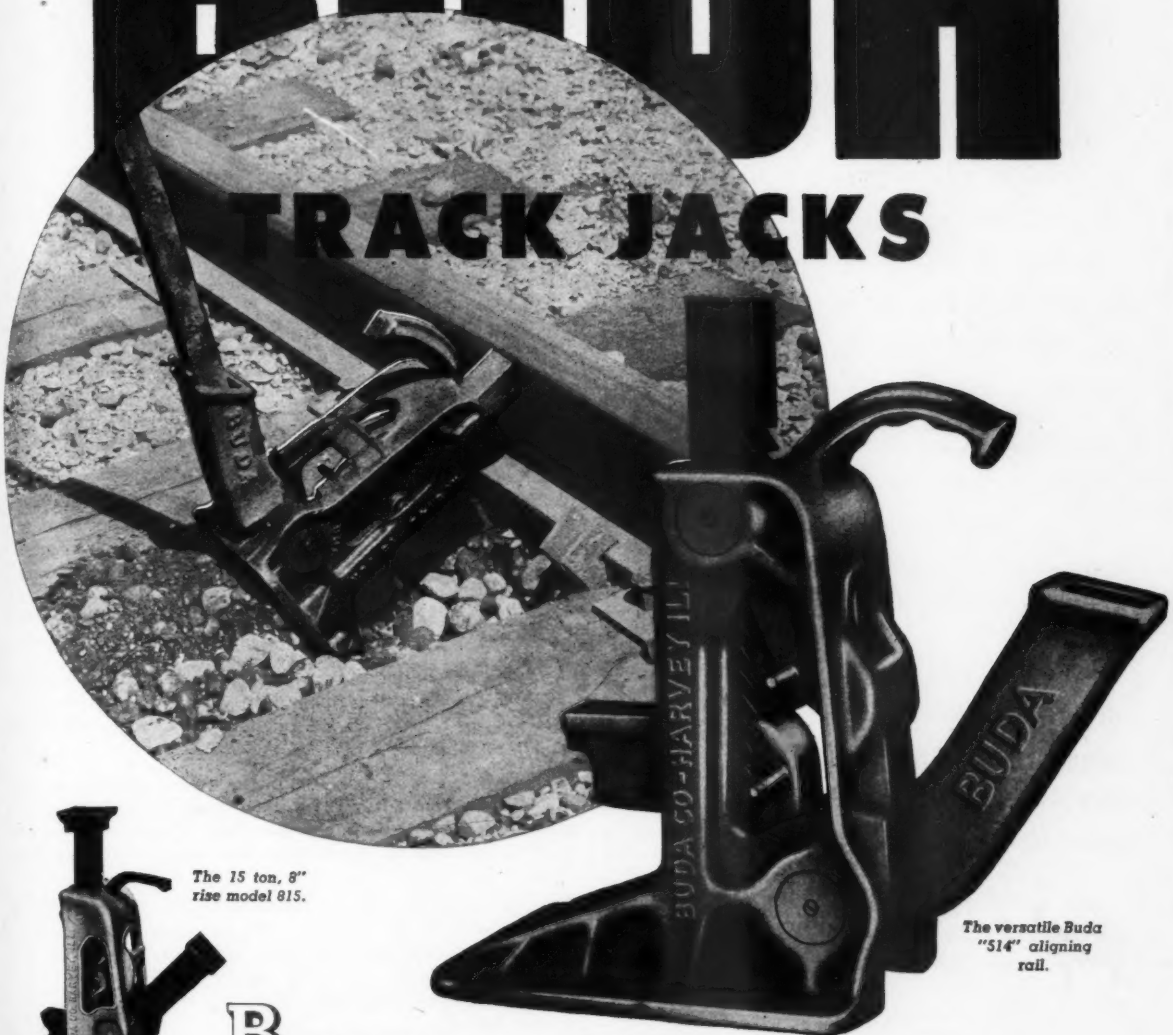
The Board of Direction met in Chicago on August 5, at which time, in addition to considering many routine association matters, it endorsed the requests of the various A.R.E.A. committees for funds from the Association of American Railroads for carrying out their research projects during 1944. These requests had already been approved by the General committee of the Engineering division.

About the middle of August, the association adopted and mailed to the chief engineering officers of member roads emergency provisions modifying its existing requirements for the testing of certain track tools. These provisions provide for a reduction in the number of test specimens required in the testing of spike mauls, sledges and track chisels, as reported in the General News columns of this issue.

Later in August, members received a letter ballot covering a proposed amendment to the constitution dealing with the qualifications for candidates to fill a vacancy in the office of vice-president. The purpose of the amendment is to enlarge the field for the selection by the Board of a person to fill such a vacancy, so that it will be consistent with present qualifications for candidates for election as vice-president. Specifically, the amendment provides that past members as well as present members of the Board of Direction will be eligible for selection.

BUDA

TRACK JACKS



The 15 ton, 8" rise model 815.

The versatile Buda "514" aligning rail.

BUDA'S wide range of track jack models includes low, medium and high lift, single or double-acting types. There's a Buda Track Jack to make *your* track work safer, easier and *faster* . . . write for the Buda Track Jack bulletin now!

THE BUDA CO., Harvey (CHICAGO SUBURB) Ill.

PUSH CARS | JACKS *for every purpose* | MOTOR CARS | *Maintenance of way* EQUIPMENT

Some R. R. are Getting

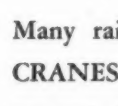
BURRO CRANES

. . . . some just ordering

Practically all railroads need more BURRO CRANES to reach their top efficiency—need them for essential work—to keep yards and terminals clear, to speed up new construction track laying and for necessary maintenance work of all sorts.

Many railroads have ordered BURRO CRANES. Some are getting them, some are not. The difference, of course, is a difference in PRIORITIES extended with orders.

Today high priorities *are available* for this essential equipment. If you are not getting the BURRO CRANE you need, help us to help you by furnishing higher priorities.



CULLEN-FRIESTEDT CO.,
1301 S. KILBOURN AVE. CHICAGO, ILLINOIS

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The third War Loan must have your whole hearted support. Every surplus dollar should be invested in Bonds. The manufacture of Tanks, Planes, Ships, Guns, Bombs, Ammunition and Supplies must go on and on . . . and be increased. A shortage of this or that will mean the loss of more and more lives.

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Our boys are giving their lives. They are enduring sweltering heat, muck, dust, rain and cold. They are not whimpering. They are expecting us to provide them with the implements of war. We must back their attack with our dollars and help them blast a path to Victory. Buy bonds today!

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WELL WATER SYSTEMS
DEEP WELL PUMPS

Builders of Well Water Systems for Every Municipal and Industrial Need

Mall TRADE MARK PORTABLE POWER Tools

KEEP MAINTENANCE MOVING

Mall CHAIN SAW

5 H.P. **GASOLINE ENGINE MODEL**

A powerful time and labor-saving tool that squares heavy timbers and logs to size, and fells trees with surprising speed. Automatic clutch prevents stalling the engine when saw is pinched or forced too hard. Eliminates hand clutch control. Only necessary for operator to manipulate engine throttle when ready to cut. Swivel feature permits cutting at necessary angles. Motorized sharpening device for sharpening right on the job. Easily transported on a hand car. Available in 24", 36" and 48" cutting capacities. Also pneumatic models.

NEW Mall TRADE MARK 1/4" DRILL 143T

A light-weight, cool running drill for continuous metal drilling under full load. Has free speed of 2850 r.p.m. and full load speed of 1850 r.p.m. Pistol grip and trigger switch simplifies use with either hand. Equipped with universal motor and ventilating fan. Easily and quickly serviced.

Mall TRADE MARK 5 H.P. Off-the-Track PORTABLE POWER UNIT

The 5 H. P. variable speed gasoline engine operates 8 quickly interchangeable tools for Circular Sawing, Grinding, Sanding, Drilling, Pumping, Wire Brushing, Concrete Vibrating, Concrete Surfacing and Sharpening Tools. It operates all day on very little fuel. The flexible shaft that transmits power to tools is properly insulated to protect signals. Off-the-track feature reduces accident hazards. Easily wheeled anywhere on the right-of-way by one man. ***Literature and prices upon application.***

RAILROAD DEPARTMENT

MALL TOOL COMPANY

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WHEN AIR BATTLES HINGE ON *Fast* REFUELING...

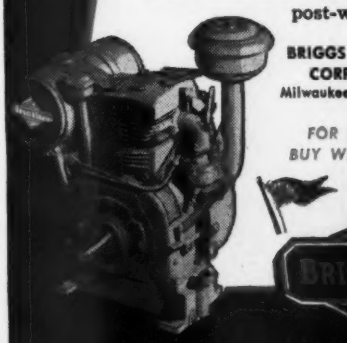
Fighting planes require fast refueling and service. Every minute counts. Pumping units, powered by small gasoline engines, provide faster servicing of planes. Here again, some of the hundreds of thousands of dependable, instant-starting Briggs & Stratton engines, now serving our armed forces, are on combat duty.

Meeting wartime demands for Briggs & Stratton gasoline engines has proved a BIG JOB. But we like big jobs. In fact, we'd like to see just how big a job we can handle with our facilities for high quality, precision production.

We will welcome the opportunity of discussing your 4-cycle, air-cooled gasoline engine requirements — either for immediate or post-war needs.

BRIGGS & STRATTON CORPORATION
Milwaukee 1, Wis., U.S.A.

FOR VICTORY BUY WAR BONDS



Classified Advertisements

Use this section when seeking a new man, new position, or when buying or selling secondhand equipment.

CLASSIFIED ADVERTISEMENTS, $10.00 an inch, one inch deep by three inches wide, an insertion.

EMPLOYMENT ADVERTISEMENTS, 10 cents a word a month, including address, minimum charge $2.00.

Remittance must accompany each order.

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Classified Advertising Department
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Wanted—sales representative with close contacts in railroad purchasing, mechanical and maintenance-of-way departments. Permanent position with large, well-established manufacturer whose products are favorably known and accepted by leading railroads. Good salary and bonus to real worker. Write Box 943, Railway Engineering and Maintenance, 105 West Adams Street, Chicago 3, Ill.

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16, 20, 24 or 30 cubic yard AIR DUMP CARS. Any quantity, type, make or location. Also 10- to 30-ton Gas or Diesel Locos.

IRON & STEEL PRODUCTS, Inc.
38 years' experience
13486 S. Brainard Ave., Chicago 33, Illinois
"ANYTHING containing IRON or STEEL"

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30 YEARS' EXPERIENCE.
CONSTRUCTION,
MAINTENANCE and REPAIR.
SUB and SUPERSTRUCTURES,
RAILROAD BRIDGES
and STRUCTURES
* UNDER TRAFFIC. *
STEEL * TIMBER * CONCRETE
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ENGINEERS AND CONTRACTORS
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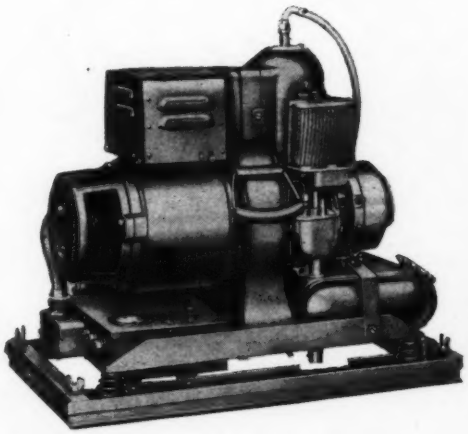

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PORTABLE GENERATORS

Sooner than you think!

This war doesn't have to last forever. We can shorten it considerably. We can get it over quickly . . . if we do all that is expected of us. This means investments . . . heavy investments . . . in War Bonds. For the more money we can turn into equipment for Victory, the sooner we can get back to the delivery of equipment you need for your work . . . Homelite Portable Generators, for example, better than ever before.

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Port Chester, New York

I. B. CRANES HELP KEEP AMERICA'S WAR PRODUCTION ROLLING AT TOP SPEED

Here in America where thousands of tons of vital war materiel for the Allied Nations is being produced, Industrial Brownhoist Cranes are playing a vital role. On railroads, in chemical plants, in steel mills, in shipyards, on docks and in big industrial plants, I. B. Cranes are using magnet, hook and bucket to load, unload and move material at top speed up to twenty-four hours a day. I. B. Cranes are built to stand up—and they are standing up on their jobs—whenever and wherever they may be. Industrial Brownhoist Corporation, Bay City, Michigan. District offices: New York, Philadelphia, Pittsburgh, Cleveland and Chicago.

INDUSTRIAL BROWNHOIST BUILDS BETTER CRANES

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WAR RIDES THE RAILS

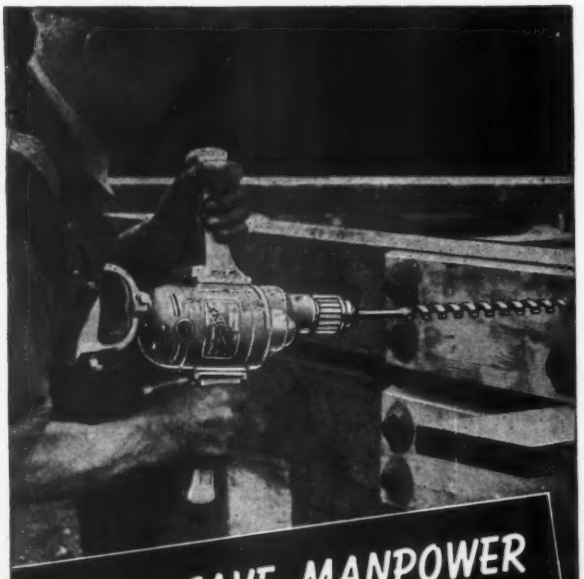
Ballast compacted uniformly makes a roadbed that "can take it." And vibratory JACKSON TAMPERS do just that to ballast.

These highly efficient roadbed tools are helping railroads to maintain the kind of track necessary for the heavy traffic of war. Their simplicity of operation helps with the manpower problem. And they can cover a lot of track quickly.

JACKSON

ELECTRIC TAMPER & EQUIPMENT CO.

LUDINGTON, MICHIGAN



YOU'LL SAVE MANPOWER WITH THE DRILLING POWER OF SKILSAW DRILLS!

● Your Bridge and Building Crews will get more work done . . . *in less time* . . . when they're equipped with SKILSAW DRILLS. These tools have the *extra* power that means *extra* speed on every operation . . . from lightest repair drilling to deepest boring in bridge timbers. Yet SKILSAW DRILLS are lighter, more compact . . . for *easier* handling on *more* jobs!

If you want to see for yourself, just ask your distributor to demonstrate SKILSAW DRILLS . . . boring holes for lag spikes and hook bolts, reaming in steel or speeding up other tough drilling jobs. Phone your distributor *today!*

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SKILSAW PORTABLE ELECTRIC TOOLS
★ MAKE AMERICA'S HANDS MORE PRODUCTIVE ★

LUFKIN "ANCHOR" CHROME CLAD STEEL TAPE FOR RAILROAD MEN

If you're looking for a quality steel tape, then a Lufkin "Anchor" Chrome Clad is the tape you want. Jet black markings on a satin chrome surface are easy to read—even in poor light. Surface won't rust, crack, chip or peel. Genuine leather hand-stitched case. Smooth winding mechanism. See your jobber and write for catalog.

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SAGINAW, MICHIGAN . NEW YORK CITY
TAPES . RULES . PRECISION TOOLS

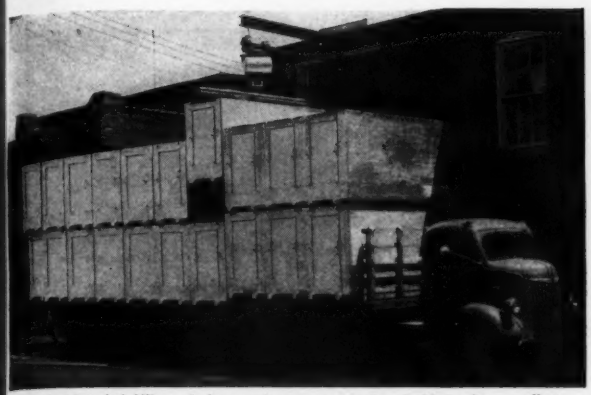
NO ASPHALT PERMITS REQUIRED FOR

OHIO VALLEY ROCK ASPHALT CO. KENTUCKY BITUROC TRADE MARK ROCK ASPHALT LOUISVILLE, KENTUCKY

"Natural" Kentucky Rock Asphalt

Crossing Pavements
Station Platforms

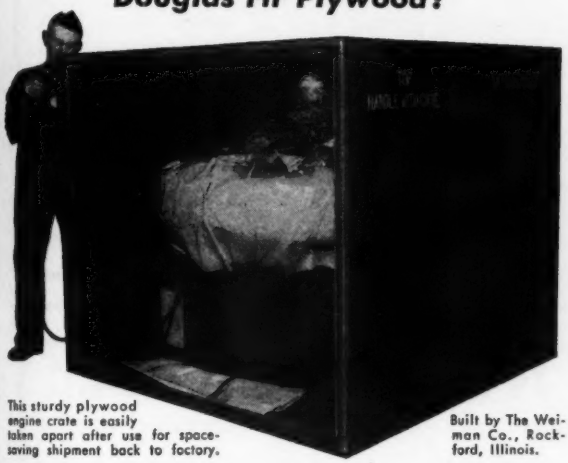
(Prices and information on request)



● Liquid-cooled Allison airplane engines are extremely valuable to the war effort. That's why they're protected from both weather and damage by re-usable Douglas Fir Plywood boxes constructed by Indianapolis Wire Bound Box Company.

Airplane engines arrive SAFE

...when shipped in crates built of Douglas Fir Plywood!



This sturdy plywood engine crate is easily taken apart after use for space-saving shipment back to factory.

Built by The Weiman Co., Rockford, Illinois.

● Millions of square feet of Douglas Fir Plywood are being used to crate engines and other aircraft parts, because this Miracle Wood offers more protection, reduces weight, saves space and gives numerous re-uses. New types of Douglas Fir Plywood crates and boxes are being developed — based on plywood's scientific advantages. After Victory, the results of this wartime crating work will be available to you — *another link in the steadily lengthening chain of technical data that will enable post-war Douglas Fir Plywood to serve you better and in more ways than ever before.*

TO HELP SPEED VICTORY
the Douglas Fir Plywood Industry is devoting its entire capacity to war production. We know this program has your approval.

Send for Free War Use Folder
Actual photographs of scores of war uses show some of the ways you can expect Douglas Fir Plywood to serve you after Victory. Write for free copy. Douglas Fir Plywood Assn., Tacoma, Wash.

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Real Lumber
MADE LARGER, LIGHTER
SPLIT-PROOF
STRONGER

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the POWER THE ENGINE DELIVERS *gets a chance to* PAY ITS WAY

That's one reason why

AMERICAN LOCOMOTIVE CRANES

ARE SUCH HIGH PRODUCERS

Anti-friction bearings on AMERICAN Locomotive Cranes insure the delivery of maximum power to wheels and drums.

Ability to throw hoist and swing gears out of mesh makes full power available for travel.

Four models — 25, 30, 35 and 40 tons capacity. Gasoline, Diesel, Diesel-Electric.

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AMERICAN TERRY DERRICK CO. . . . South Kearny, N. J.

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a Quimby Pump for every purpose

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Q & C Manganese Steel Switch Point Guards will guard against wear on switch points from either facing point or trailing movements and will prevent derailments caused by wheels climbing on worn points.

Order now to help keep your traffic moving without delays.

THE Q AND C COMPANY

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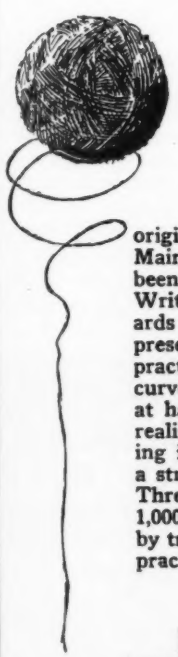

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Because the burden of heavy-duty engine operation falls on the crankshaft, we feel that no crankshaft can be made "too good". We build them as good as we know how.

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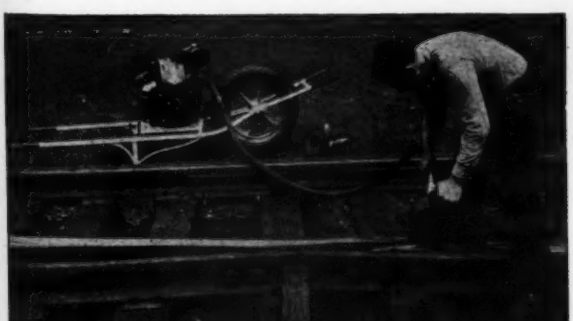

Model P-22 Railway Track-work Grinder—one of many models

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Electrided to Resist Wear!

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15-tons capacity. Height, 22¾"; lift, 13"; toe lift 2½" from ground level. Weight: 60 lbs.

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Simplex Jacks and Track Tools Increase Your Manpower
Use Simplex Rail Pullers and Expanders; G-Y Tie Spacers and Bridge Jacks.

Simplex
LEVER · SCREW · HYDRAULIC
Jacks

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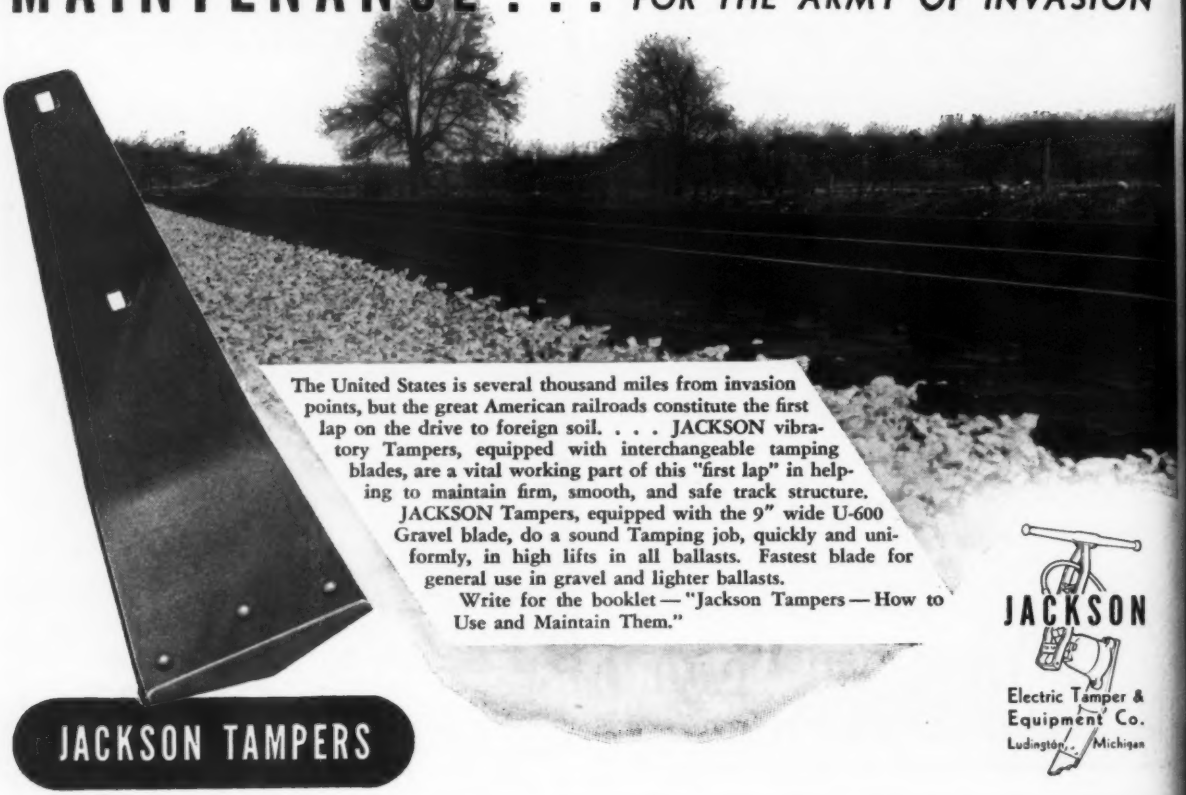
. . . While Traffic Rolls

Roll a drum of INSTANT-USE over to the hole in the floor—remove the lid—shovel out enough to fill the hole—tamp smooth—and open the spot to regular traffic immediately, without waiting. You'll have a tough, solid, permanent patch that formerly took 24 hours to get. This rugged, new plastic bonds tight to old concrete, withstands extreme loads. Keep a drum on hand. Immediate shipment.

Request Descriptive Folder And Details of FREE TRIAL OFFER

INSTANT-USE
FLEXROCK CO., 2347 Manning St., Phila., Pa.

MAINTENANCE . . . *FOR THE ARMY OF INVASION*



The United States is several thousand miles from invasion points, but the great American railroads constitute the first lap on the drive to foreign soil. . . . JACKSON vibratory Tampers, equipped with interchangeable tamping blades, are a vital working part of this "first lap" in helping to maintain firm, smooth, and safe track structure.

JACKSON Tampers, equipped with the 9" wide U-600 Gravel blade, do a sound Tamping job, quickly and uniformly, in high lifts in all ballasts. Fastest blade for general use in gravel and lighter ballasts.

Write for the booklet — "Jackson Tampers — How to Use and Maintain Them."

JACKSON TAMPERS

JACKSON

Electric Tamper & Equipment Co.

Ludington, Michigan

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IMPROVED HIPOWERS

IMPROVE TRACK

In these days, when railway track is being subjected to the heaviest traffic in history Improved Hipowers are more important than ever in maintaining initial bolt tensions, assuring resilience of joints and protecting rail ends.

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A COMPLETE LINE OF RAILWAY SPRING WASHERS

FASTER TRACK FOR THE IRON WARHORSE

We talked to men like you before this newest Blue Brute was born, found out you wanted this: a tie tamper powerful enough for continuous work, but lighter, easier-handling for more tamping speed.

Here it is: the WTT-7. Strong, yes, but "weight-tamed" by improved design. Only 42 pounds including tamping bar! The new design reduces risk of freezing. New type of throttle ends air loss from leakage. Total result: more lineal feet per day in finished surfacing. For spot and out-of-face tamping — unsurpassed!

Better investigate this improved Blue Brute, and while you're at it, see what other Worthington Rock Drills and Air Tools can *better* meet your needs today. Blue Brute compressors, too . . . portable, semi-portable . . . gasolene, Diesel and electric-driven . . . save air, save time on wartime railroad jobs—"throats" made for longer breathing by low-maintenance Feather Valves*. Get both — Blue Brute Rock Drills and Air Tools for the air they save you . . . Blue Brute Compressors for more air delivered!

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‡Blue Brute Compressors and Air Tools are painted olive drab for the Army and battleship gray for the Navy.

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BLUE BRUTES

Blue Brutes are with the Yanks today, keeping railroad supply lines open behind desert and jungle battlefields. They also helped the British 8th Army keep Rommel on the run. Farther behind the lines, here at home, Blue Brutes in "uniforms" of olive drab or battleship gray‡ are serving in hundreds of Army camps, Navy yards, air bases and ordnance plants.

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